

Further Mathematics - Degree in Engineering - 2024/2025

03-Differential Geometry-Hand exam for serial number: 1

Exercise 1

Compute the center of curvature for $C(t) = \{-2t^2, 2t, 2t^2\}$ at the point $t = -1$.

- 1) $\{-9.7, 17.6, -7.9\}$
- 2) $\{-19.3, 1.6, 8.1\}$
- 3) $\{-6.5, 16., 6.5\}$
- 4) $\{-8.1, 14.4, 20.9\}$
- 5) $\{-12.9, 12.8, -1.5\}$

Exercise 2

Compute the Gauss curvature for $X(u,v) = \{\cos[u], \sin[u], v\}$ at the point $(u,v) = (5, 9)$.

- 1) $K(5, 9) = 4.35809$
- 2) $K(5, 9) = -2.81031$
- 3) $K(5, 9) = 1.03979$
- 4) $K(5, 9) = 0$
- 5) $K(5, 9) = 1.40162$

Further Mathematics - Degree in Engineering - 2024/2025

03-Differential Geometry-Hand exam for serial number: 2

Exercise 1

Compute the center of curvature for $C(t) = \{3 + 2t, t^2, t^2\}$ at the point $t=1$.

- 1) $\{-0.2, 2.8, 5.2\}$
- 2) $\{-3.4, 7.6, 2.4\}$
- 3) $\{2.6, 4.4, 4.8\}$
- 4) $\{1.4, 6., 4.8\}$
- 5) $\{-1., 4., 4.\}$

Exercise 2

Compute the Gauss curvature for $X(u,v) = \{v \cos[u], v \sin[u], v\}$ at the point $(u,v) = (1, 9)$.

- 1) $K(1, 9) = 4.86402$
- 2) $K(1, 9) = 0$
- 3) $K(1, 9) = 4.3597$
- 4) $K(1, 9) = -0.888696$
- 5) $K(1, 9) = -1.05082$

Further Mathematics - Degree in Engineering - 2024/2025 03-Differential Geometry-Hand exam for serial number: 3

Exercise 1

Compute the center of curvature for $C(t) = \{t^2, -3t^2, 3-t\}$ at the point $t = -2$.

- 1) $\{-51.35, 217.45, -158.5\}$
- 2) $\{-51.35, 122.35, -443.8\}$
- 3) $\{12.05, -36.15, -317.\}$
- 4) $\{107.15, 154.05, -443.8\}$
- 5) $\{297.35, -226.35, -380.4\}$

Exercise 2

Compute the mean curvature for $X(u,v) = \{\cos[u], \sin[u], v\}$ at the point $(u,v) = (3, 3)$.

- 1) $H(3, 3) = 3.24274$
- 2) $H(3, 3) = 0.5$
- 3) $H(3, 3) = -7.12903$
- 4) $H(3, 3) = -1.65785$
- 5) $H(3, 3) = 6.88061$

Further Mathematics - Degree in Engineering - 2024/2025

03-Differential Geometry-Hand exam for serial number: 4

Exercise 1

Compute the center of curvature for $C(t) = \{-3 + 3t, 2t^2, -t^2\}$ at the point $t = -2$.

- 1) $\{90.3333, -14.2, -27.9\}$
- 2) $\{95.3333, -14.2, 27.1\}$
- 3) $\{40.3333, -14.2, -37.9\}$
- 4) $\{50.3333, 25.8, -12.9\}$
- 5) $\{70.3333, 15.8, -27.9\}$

Exercise 2

Compute the Gauss curvature for $X(u,v) = \{\cos[u], \sin[u], v\}$ at the point $(u,v) = (2, 5)$.

- 1) $K(2, 5) = 0$
- 2) $K(2, 5) = -6.88161$
- 3) $K(2, 5) = -1.54351$
- 4) $K(2, 5) = 3.06606$
- 5) $K(2, 5) = -2.25764$

Further Mathematics - Degree in Engineering - 2024/2025

03-Differential Geometry-Hand exam for serial number: 5

Exercise 1

Compute the center of curvature for $C(t) = \{-t, 3t^2, 3t^2\}$ at the point $t=2$.

- 1) $\{172.8, -367.117, 554.483\}$
- 2) $\{806.4, -367.117, -367.117\}$
- 3) $\{403.2, 208.883, 151.283\}$
- 4) $\{979.2, 381.683, -251.917\}$
- 5) $\{576., 36.0833, 36.0833\}$

Exercise 2

Compute the mean curvature for $X(u,v) = \{e^v \cos[u], e^v \sin[u], v\}$ at the point $(u,v) = (5, 8)$.

- 1) $H(5, 8) = 0.999224$
- 2) $H(5, 8) = 0$
- 3) $H(5, 8) = 3.49594$
- 4) $H(5, 8) = 5.42866$
- 5) $H(5, 8) = 8.78112$

Further Mathematics - Degree in Engineering - 2024/2025

03-Differential Geometry-Hand exam for serial number: 6

Exercise 1

Compute the center of curvature for $C(t) = \{t^2, -t, -2t^2\}$ at the point $t=2$.

- 1) $\{-19.9, 240., -136.2\}$
- 2) $\{156.1, 176., -56.2\}$
- 3) $\{12.1, 160., -24.2\}$
- 4) $\{-67.9, 304., -168.2\}$
- 5) $\{92.1, 80., -152.2\}$

Exercise 2

Compute the Gauss curvature for $X(u,v) = \{u, 2u^2, v\}$ at the point $(u,v) = (2, 4)$.

- 1) $K(2, 4) = 1.87994$
- 2) $K(2, 4) = 0$
- 3) $K(2, 4) = -4.2161$
- 4) $K(2, 4) = -4.06116$
- 5) $K(2, 4) = 5.78186$

Further Mathematics - Degree in Engineering - 2024/2025

03-Differential Geometry-Hand exam for serial number: 7

Exercise 1

Compute the center of curvature for $C(t) = \{3t^2, -2t^2, -2-3t\}$ at the point $t=1$.

- 1) $\{19.0385, 6.80769, 9.33333\}$
- 2) $\{10.0385, -6.69231, 15.3333\}$
- 3) $\{1.03846, -9.69231, 6.33333\}$
- 4) $\{22.0385, 2.30769, 27.3333\}$
- 5) $\{23.5385, -15.6923, 24.3333\}$

Exercise 2

Compute the mean curvature for $X(u,v) = \{\cos[u], \sin[u], v\}$ at the point $(u,v) = (1, 5)$.

- 1) $H(1, 5) = 5.70747$
- 2) $H(1, 5) = 0.5$
- 3) $H(1, 5) = -8.16298$
- 4) $H(1, 5) = 4.64597$
- 5) $H(1, 5) = -3.83697$

Further Mathematics - Degree in Engineering - 2024/2025

03-Differential Geometry-Hand exam for serial number: 8

Exercise 1

Compute the center of curvature for $C(t) = \{2t^2, 2t^2, -3+2t\}$ at the point $t=1$.

- 1) $\{23.6, 12.2, -3.8\}$
- 2) $\{6.5, 6.5, -19.\}$
- 3) $\{17.9, 21.7, -36.1\}$
- 4) $\{21.7, -3., -3.8\}$
- 5) $\{21.7, 16., -20.9\}$

Exercise 2

Compute the Gauss curvature for $X(u,v) = \{3u, 3u^2, v\}$ at the point $(u,v) = (9, 6)$.

- 1) $K(9, 6) = 0$
- 2) $K(9, 6) = 4.08427$
- 3) $K(9, 6) = -5.69932$
- 4) $K(9, 6) = 4.72865$
- 5) $K(9, 6) = -3.19731$

Further Mathematics - Degree in Engineering - 2024/2025

03-Differential Geometry-Hand exam for serial number: 9

Exercise 1

Compute the center of curvature for $C(t) = \{3 - 2t, t^2, -2t^2\}$ at the point $t = 3$.

- 1) $\{491.4, -136.4, -82.1\}$
- 2) $\{273., 27.4, -54.8\}$
- 3) $\{518.7, -54.5, 190.9\}$
- 4) $\{163.8, -27.2, 163.6\}$
- 5) $\{218.4, 273.1, -191.3\}$

Exercise 2

Compute the Gauss curvature for $X(u,v) = \{v \cos[u], v \sin[u], v\}$ at the point $(u,v) = (3, 3)$.

- 1) $K(3, 3) = 0$
- 2) $K(3, 3) = 1.70593$
- 3) $K(3, 3) = -5.3444$
- 4) $K(3, 3) = 2.08909$
- 5) $K(3, 3) = -2.5683$

Further Mathematics - Degree in Engineering - 2024/2025

03-Differential Geometry-Hand exam for serial number: 10

Exercise 1

Compute the center of curvature for $C(t) = \{2t^2, 3t^2, 3-t\}$ at the point $t = -2$.

- 1) $\{-99.8231, 160.015, -743.4\}$
- 2) $\{230.577, 201.315, -454.3\}$
- 3) $\{-306.323, 325.215, -330.4\}$
- 4) $\{24.0769, 36.1154, -413.\}$
- 5) $\{230.577, -252.985, -41.3\}$

Exercise 2

Compute the mean curvature for $X(u,v) = \{v^2 \cos[u], v^2 \sin[u], v\}$ at the point $(u,v) = (2, 7)$.

- 1) $H(2, 7) = 6.92337$
- 2) $H(2, 7) = 0.000365351$
- 3) $H(2, 7) = -7.43792$
- 4) $H(2, 7) = 0.667698$
- 5) $H(2, 7) = 6.1212$

Further Mathematics - Degree in Engineering - 2024/2025
03-Differential Geometry-Hand exam for serial number: 11

Exercise 1

Compute the center of curvature for $C(t) = \{3t^2, -1+t, -3t^2\}$ at the point $t=2$.

- 1) $\{555.383, -288.5, 483.217\}$
- 2) $\{36.0833, -577., -36.0833\}$
- 3) $\{497.683, -1096.3, -324.583\}$
- 4) $\{555.383, -1096.3, 194.717\}$
- 5) $\{-79.3167, -807.8, -324.583\}$

Exercise 2

Compute the mean curvature for $X(u,v) = \{u, 3u, v\}$ at the point $(u,v) = (2, 9)$.

- 1) $H(2, 9) = -0.753107$
- 2) $H(2, 9) = 0$
- 3) $H(2, 9) = 0.569949$
- 4) $H(2, 9) = 1.52708$
- 5) $H(2, 9) = -1.95044$

Further Mathematics - Degree in Engineering - 2024/2025

03-Differential Geometry-Hand exam for serial number: 12

Exercise 1

Compute the center of curvature for $C(t) = \{3t^2, 1+t, 3t^2\}$ at the point $t = -3$.

- 1) $\{1053.58, 3112., -1085.92\}$
- 2) $\{-1669.42, 2334., -1085.92\}$
- 3) $\{-1280.42, 3112., -1280.42\}$
- 4) $\{-1669.42, 583.5, -1474.92\}$
- 5) $\{81.0833, 1945., 81.0833\}$

Exercise 2

Compute the Gauss curvature for $X(u,v) = \{\cos[u], \sin[u], v\}$ at the point $(u,v) = (5, 8)$.

- 1) $K(5, 8) = 6.76296$
- 2) $K(5, 8) = -5.99566$
- 3) $K(5, 8) = -0.504007$
- 4) $K(5, 8) = 1.17206$
- 5) $K(5, 8) = 0$

Further Mathematics - Degree in Engineering - 2024/2025

03-Differential Geometry-Hand exam for serial number: 13

Exercise 1

Compute the center of curvature for $C(t) = \{-2t^2, 1+t, -2t^2\}$ at the point $t=1$.

- 1) $\{-6.125, -31., -6.125\}$
- 2) $\{-3.025, -6.2, -15.425\}$
- 3) $\{-12.325, -15.5, -34.025\}$
- 4) $\{21.775, -55.8, -9.225\}$
- 5) $\{9.375, -24.8, -12.325\}$

Exercise 2

Compute the Gauss curvature for $X(u,v) = \{v^2 \cos[u], v^2 \sin[u], v\}$ at the point $(u,v) = (5, 10)$.

- 1) $K(5, 10) = 4.80426$
- 2) $K(5, 10) = 0.62959$
- 3) $K(5, 10) = 4.11858$
- 4) $K(5, 10) = -1.24377 \times 10^{-7}$
- 5) $K(5, 10) = 6.25789$

Further Mathematics - Degree in Engineering - 2024/2025
03-Differential Geometry-Hand exam for serial number: 14

Exercise 1

Compute the center of curvature for $C(t) = \{2t^2, -t^2, 1-3t\}$ at the point $t=1$.

- 1) $\{8.5, -7.4, 4.86667\}$
- 2) $\{12., -7.4, 13.9667\}$
- 3) $\{2.9, -6.7, 4.86667\}$
- 4) $\{6.4, -6., 9.76667\}$
- 5) $\{7.8, -3.9, 7.66667\}$

Exercise 2

Compute the Gauss curvature for $X(u,v) = \{\cos[u], \sin[u], v\}$ at the point $(u,v) = (3, 7)$.

- 1) $K(3, 7) = 7.13573$
- 2) $K(3, 7) = -7.75156$
- 3) $K(3, 7) = 6.42383$
- 4) $K(3, 7) = 4.59777$
- 5) $K(3, 7) = 0$

Further Mathematics - Degree in Engineering - 2024/2025

03-Differential Geometry-Hand exam for serial number: 15

Exercise 1

Compute the center of curvature for $C(t) = \{2t^2, 3t^2, -2-2t\}$ at the point $t=2$.

- 1) $\{-78.6923, 139.462, 164.8\}$
- 2) $\{-140.492, -66.5385, 350.2\}$
- 3) $\{168.508, 98.2615, 185.4\}$
- 4) $\{24.3077, 36.4615, 206.\}$
- 5) $\{-161.092, -45.9385, 288.4\}$

Exercise 2

Compute the mean curvature for $X(u,v) = \{e^v \cos[u], e^v \sin[u], v\}$ at the point $(u,v) = (4, 5)$.

- 1) $H(4, 5) = 1.03051 \times 10^{-9}$
- 2) $H(4, 5) = 4.41664$
- 3) $H(4, 5) = -3.37264$
- 4) $H(4, 5) = -7.86587$
- 5) $H(4, 5) = 5.40088$

Further Mathematics - Degree in Engineering - 2024/2025

03-Differential Geometry-Hand exam for serial number: 16

Exercise 1

Compute the center of curvature for $C(t) = \{t^2, -2+t, -3t^2\}$ at the point $t=2$.

- 1) $\{-181.15, -257.6, 189.25\}$
- 2) $\{108.65, -257.6, -68.35\}$
- 3) $\{-52.35, -161., -261.55\}$
- 4) $\{12.05, -322., -36.15\}$
- 5) $\{-148.95, -450.8, 157.05\}$

Exercise 2

Compute the Gauss curvature for $X(u,v) = \{\cos[u], \sin[u], v\}$ at the point $(u,v) = (3, 10)$.

- 1) $K(3, 10) = 1.5243$
- 2) $K(3, 10) = -6.53526$
- 3) $K(3, 10) = 0$
- 4) $K(3, 10) = -1.39851$
- 5) $K(3, 10) = -4.02945$

Further Mathematics - Degree in Engineering - 2024/2025
03-Differential Geometry-Hand exam for serial number: 17

Exercise 1

Compute the center of curvature for $C(t) = \{-3t^2, -1-2t, -3t^2\}$ at the point $t = -2$.

- 1) $\{50.3667, -57.8, 223.767\}$
- 2) $\{-123.033, -173.4, -267.533\}$
- 3) $\{-36.3333, -289., -36.3333\}$
- 4) $\{165.967, -260.1, -94.1333\}$
- 5) $\{21.4667, -28.9, 194.867\}$

Exercise 2

Compute the mean curvature for $X(u,v) = \{v \cos[u], v \sin[u], v\}$ at the point $(u,v) = (1, 5)$.

- 1) $H(1, 5) = -8.06808$
- 2) $H(1, 5) = 0.0707107$
- 3) $H(1, 5) = -6.22551$
- 4) $H(1, 5) = -5.65894$
- 5) $H(1, 5) = -6.44645$

Further Mathematics - Degree in Engineering - 2024/2025

03-Differential Geometry-Hand exam for serial number: 18

Exercise 1

Compute the center of curvature for $C(t) = \{-2 - t, -2t^2, 2t^2\}$ at the point $t=1$.

- 1) $\{51., -15.125, 24.125\}$
- 2) $\{45., -21.125, -14.875\}$
- 3) $\{30., -6.125, 6.125\}$
- 4) $\{24., -12.125, 27.125\}$
- 5) $\{33., -12.125, -11.875\}$

Exercise 2

Compute the Gauss curvature for $X(u,v) = \{u, 2u, v\}$ at the point $(u,v) = (3, 9)$.

- 1) $K(3, 9) = 0.606312$
- 2) $K(3, 9) = -3.72075$
- 3) $K(3, 9) = 0.834361$
- 4) $K(3, 9) = 1.64276$
- 5) $K(3, 9) = 0$

Further Mathematics - Degree in Engineering - 2024/2025
03-Differential Geometry-Hand exam for serial number: 19

Exercise 1

Compute the center of curvature for $C(t) = \{-t^2, 3 + 3t, 3t^2\}$ at the point $t = -3$.

- 1) $\{-27.45, 363., 82.35\}$
- 2) $\{-208.95, 653.4, 409.05\}$
- 3) $\{-100.05, 544.5, 227.55\}$
- 4) $\{-136.35, 689.7, -244.35\}$
- 5) $\{226.65, 217.8, 118.65\}$

Exercise 2

Compute the Gauss curvature for $X(u,v) = \{\cos[u], \sin[u], v\}$ at the point $(u,v) = (5, 10)$.

- 1) $K(5, 10) = -1.949$
- 2) $K(5, 10) = -4.3359$
- 3) $K(5, 10) = 0$
- 4) $K(5, 10) = -4.48734$
- 5) $K(5, 10) = -1.39376$

Further Mathematics - Degree in Engineering - 2024/2025

03-Differential Geometry-Hand exam for serial number: 20

Exercise 1

Compute the center of curvature for $C(t) = \{2 + 2t, -3t^2, -3t^2\}$ at the point $t = -1$.

- 1) $\{7.6, -1.73333, 17.2667\}$
- 2) $\{68.4, 21.0667, 13.4667\}$
- 3) $\{64.6, -28.3333, -24.5333\}$
- 4) $\{7.6, -5.53333, -28.3333\}$
- 5) $\{38., -9.33333, -9.33333\}$

Exercise 2

Compute the Gauss curvature for $X(u,v) = \{\cos[u], \sin[u], v\}$ at the point $(u,v) = (3, 4)$.

- 1) $K(3, 4) = -2.94528$
- 2) $K(3, 4) = -5.38225$
- 3) $K(3, 4) = 8.065$
- 4) $K(3, 4) = 0$
- 5) $K(3, 4) = 4.65376$

Further Mathematics - Degree in Engineering - 2024/2025 03-Differential Geometry-Hand exam for serial number: 21

Exercise 1

Compute the center of curvature for $C(t) = \{2t^2, -3 + 2t, -t^2\}$ at the point $t = 2$.

- 1) $\{-16.7, -124.5, -70.5\}$
- 2) $\{24.8, -83., -12.4\}$
- 3) $\{-25., -124.5, -70.5\}$
- 4) $\{58., -107.9, 45.7\}$
- 5) $\{41.4, -8.3, -37.3\}$

Exercise 2

Compute the Gauss curvature for $X(u,v) = \{\cos[u], \sin[u], v\}$ at the point $(u,v) = (4, 10)$.

- 1) $K(4, 10) = 0$
- 2) $K(4, 10) = -5.20499$
- 3) $K(4, 10) = -6.46351$
- 4) $K(4, 10) = -5.13401$
- 5) $K(4, 10) = 6.02739$

Further Mathematics - Degree in Engineering - 2024/2025

03-Differential Geometry-Hand exam for serial number: 22

Exercise 1

Compute the center of curvature for $C(t) = \{-3t^2, -3-2t, t^2\}$ at the point $t=3$.

- 1) $\{-296.4, 214.8, -133.9\}$
- 2) $\{401.7, 1020.3, 134.6\}$
- 3) $\{-81.6, 537., 27.2\}$
- 4) $\{-296.4, 1020.3, -80.2\}$
- 5) $\{-296.4, 107.4, 80.9\}$

Exercise 2

Compute the mean curvature for $X(u,v) = \{u, 2u^2, v\}$ at the point $(u,v) = (5, 4)$.

- 1) $H(5, 4) = -4.82869$
- 2) $H(5, 4) = -6.65468$
- 3) $H(5, 4) = 8.37124$
- 4) $H(5, 4) = -3.31211$
- 5) $H(5, 4) = 0.000249065$

Further Mathematics - Degree in Engineering - 2024/2025

03-Differential Geometry-Hand exam for serial number: 23

Exercise 1

Compute the center of curvature for $C(t) = \{-2t^2, 3-t, -2t^2\}$ at the point $t = -3$.

- 1) $\{-656.825, -172.2, 720.775\}$
- 2) $\{204.175, -602.7, 548.575\}$
- 3) $\{204.175, -602.7, 31.975\}$
- 4) $\{-54.125, -861., -54.125\}$
- 5) $\{-829.025, -602.7, 548.575\}$

Exercise 2

Compute the Gauss curvature for $X(u,v) = \{v \cos[u], v \sin[u], v\}$ at the point $(u,v) = (1, 10)$.

- 1) $K(1, 10) = 2.33879$
- 2) $K(1, 10) = -3.1883$
- 3) $K(1, 10) = -0.778112$
- 4) $K(1, 10) = 7.23709$
- 5) $K(1, 10) = 0$

Further Mathematics - Degree in Engineering - 2024/2025
03-Differential Geometry-Hand exam for serial number: 24

Exercise 1

Compute the center of curvature for $C(t) = \{-2 + 2t, -2t^2, -2t^2\}$ at the point $t = -1$.

- 1) $\{2.8, -14.9, 0.5\}$
- 2) $\{14., -6.5, -6.5\}$
- 3) $\{4.2, -2.3, -14.9\}$
- 4) $\{1.4, -3.7, -0.9\}$
- 5) $\{16.8, 1.9, -12.1\}$

Exercise 2

Compute the mean curvature for $X(u,v) = \{u, 2u^2, v\}$ at the point $(u,v) = (5, 10)$.

- 1) $H(5, 10) = 0.000249065$
- 2) $H(5, 10) = 2.84941$
- 3) $H(5, 10) = 7.55054$
- 4) $H(5, 10) = -4.54001$
- 5) $H(5, 10) = 3.65296$

Further Mathematics - Degree in Engineering - 2024/2025

03-Differential Geometry-Hand exam for serial number: 25

Exercise 1

Compute the center of curvature for $C(t) = \{-t^2, 2+2t, -3t^2\}$ at the point $t=0$.

- 1) $\{-0.6, 2.6, -2.2\}$
- 2) $\{-0.2, 2., -0.6\}$
- 3) $\{-2., 2.4, -1.\}$
- 4) $\{0.2, 2.6, 1.2\}$
- 5) $\{-0.6, 3.4, -1.\}$

Exercise 2

Compute the mean curvature for $X(u,v) = \{\cos[u], \sin[u], v\}$ at the point $(u,v) = (1, 5)$.

- 1) $H(1, 5) = 0.5$
- 2) $H(1, 5) = 7.63293$
- 3) $H(1, 5) = 4.92771$
- 4) $H(1, 5) = 7.04573$
- 5) $H(1, 5) = 4.41862$

Further Mathematics - Degree in Engineering - 2024/2025

03-Differential Geometry-Hand exam for serial number: 26

Exercise 1

Compute the center of curvature for $C(t) = \{-t^2, 2t^2, 2-2t\}$ at the point $t = -1$.

- 1) $\{3.8, -0.4, -8.8\}$
- 2) $\{-8.2, 1.2, -0.8\}$
- 3) $\{-3.4, 6.8, -8.\}$
- 4) $\{-9., 2.8, -7.2\}$
- 5) $\{1.4, 11.6, -11.2\}$

Exercise 2

Compute the mean curvature for $X(u,v) = \{3u, 3, v\}$ at the point $(u,v) = (4, 1)$.

- 1) $H(4, 1) = -4.45164$
- 2) $H(4, 1) = 6.77644$
- 3) $H(4, 1) = 0$
- 4) $H(4, 1) = -4.76466$
- 5) $H(4, 1) = 5.10831$

Further Mathematics - Degree in Engineering - 2024/2025

03-Differential Geometry-Hand exam for serial number: 27

Exercise 1

Compute the center of curvature for $C(t) = \{-3t, -2t^2, -2t^2\}$ at the point $t = -2$.

- 1) $\{-51.3333, -8.125, 34.375\}$
- 2) $\{-127.833, -16.625, -76.125\}$
- 3) $\{-68.3333, -59.125, 8.875\}$
- 4) $\{-85.3333, -25.125, -25.125\}$
- 5) $\{-17.3333, -50.625, -84.625\}$

Exercise 2

Compute the Gauss curvature for $X(u,v) = \{v^2 \cos[u], v^2 \sin[u], v\}$ at the point $(u,v) = (3, 1)$.

- 1) $K(3, 1) = -6.21626$
- 2) $K(3, 1) = -7.13192$
- 3) $K(3, 1) = 5.01211$
- 4) $K(3, 1) = 8.04131$
- 5) $K(3, 1) = -0.08$

Further Mathematics - Degree in Engineering - 2024/2025

03-Differential Geometry-Hand exam for serial number: 28

Exercise 1

Compute the center of curvature for $C(t) = \{-2t^2, -2t^2, -2+t\}$ at the point $t = -1$.

- 1) $\{-15.125, 11.875, 24.\}$
- 2) $\{-6.125, -6.125, 30.\}$
- 3) $\{-3.125, 14.875, 24.\}$
- 4) $\{8.875, 11.875, 3.\}$
- 5) $\{-15.125, -3.125, 18.\}$

Exercise 2

Compute the mean curvature for $X(u,v) = \{v^2 \cos[u], v^2 \sin[u], v\}$ at the point $(u,v) = (2, 1)$.

- 1) $H(2, 1) = 0.134164$
- 2) $H(2, 1) = -4.00361$
- 3) $H(2, 1) = 8.77863$
- 4) $H(2, 1) = 7.43502$
- 5) $H(2, 1) = 1.40438$

Further Mathematics - Degree in Engineering - 2024/2025 03-Differential Geometry-Hand exam for serial number: 29

Exercise 1

Compute the center of curvature for $C(t) = \{-2 + t, 3t^2, t^2\}$ at the point $t=1$.

- 1) $\{-21., 17.55, -26.35\}$
- 2) $\{-42., 9.15, 3.05\}$
- 3) $\{-67.2, -11.85, 32.45\}$
- 4) $\{-54.6, -7.65, -26.35\}$
- 5) $\{-67.2, 38.55, -26.35\}$

Exercise 2

Compute the mean curvature for $X(u,v) = \{v^2 \cos[u], v^2 \sin[u], v\}$ at the point $(u,v) = (6, 2)$.

- 1) $H(6, 2) = -5.11591$
- 2) $H(6, 2) = 0.0160502$
- 3) $H(6, 2) = -0.924503$
- 4) $H(6, 2) = 7.22335$
- 5) $H(6, 2) = 4.2705$

Further Mathematics - Degree in Engineering - 2024/2025

03-Differential Geometry-Hand exam for serial number: 30

Exercise 1

Compute the center of curvature for $C(t) = \{-2 + 3t, t^2, -3t^2\}$ at the point $t=0$.

- 1) $\{-3.2, -1.15, -1.55\}$
- 2) $\{-2., 0.45, -1.35\}$
- 3) $\{-3.4, -0.55, -0.35\}$
- 4) $\{-3.8, 2.05, -0.35\}$
- 5) $\{-3.8, 0.25, -2.55\}$

Exercise 2

Compute the mean curvature for $X(u,v) = \{\cos[u], \sin[u], v\}$ at the point $(u,v) = (4, 2)$.

- 1) $H(4, 2) = 0.5$
- 2) $H(4, 2) = 2.56754$
- 3) $H(4, 2) = -0.300313$
- 4) $H(4, 2) = -4.0338$
- 5) $H(4, 2) = 7.64262$

Further Mathematics - Degree in Engineering - 2024/2025
03-Differential Geometry-Hand exam for serial number: 31

Exercise 1

Compute the center of curvature for $C(t) = \{2t^2, 3t^2, 1+2t\}$ at the point $t=0$.

- 1) $\{0.707692, 1.16154, 0.7\}$
- 2) $\{-0.292308, 1.26154, 0.5\}$
- 3) $\{0.307692, 0.461538, 1.\}$
- 4) $\{-0.0923077, -0.238462, 1.9\}$
- 5) $\{0.00769231, 0.361538, 1.8\}$

Exercise 2

Compute the mean curvature for $X(u,v) = \{e^v \cos[u], e^v \sin[u], v\}$ at the point $(u,v) = (6, 5)$.

- 1) $H(6, 5) = 4.70594$
- 2) $H(6, 5) = -2.61276$
- 3) $H(6, 5) = 1.03051 \times 10^{-9}$
- 4) $H(6, 5) = -2.31207$
- 5) $H(6, 5) = 7.33559$

Further Mathematics - Degree in Engineering - 2024/2025
03-Differential Geometry-Hand exam for serial number: 32

Exercise 1

Compute the center of curvature for $C(t) = \{-3 + 3t, -t^2, 3t^2\}$ at the point $t=1$.

- 1) $\{-25.9333, -1.85, 24.75\}$
- 2) $\{-27.5333, -16.25, 21.55\}$
- 3) $\{-16.3333, -3.45, 10.35\}$
- 4) $\{-29.1333, 1.35, 15.15\}$
- 5) $\{-5.13333, 7.75, 11.95\}$

Exercise 2

Compute the Gauss curvature for $X(u,v) = \{2u, 3, v\}$ at the point $(u,v) = (10, 9)$.

- 1) $K(10, 9) = 0$
- 2) $K(10, 9) = 3.85795$
- 3) $K(10, 9) = -6.71335$
- 4) $K(10, 9) = 2.01532$
- 5) $K(10, 9) = -4.77746$

Further Mathematics - Degree in Engineering - 2024/2025

03-Differential Geometry-Hand exam for serial number: 33

Exercise 1

Compute the center of curvature for $C(t) = \{-3 + t, -3t^2, 2t^2\}$ at the point $t = 2$.

- 1) $\{-209.5, 47.6846, -59.7231\}$
- 2) $\{-335.2, -203.715, 359.277\}$
- 3) $\{-251.4, 340.985, 149.777\}$
- 4) $\{-419., -36.1154, 24.0769\}$
- 5) $\{-628.5, 299.085, -17.8231\}$

Exercise 2

Compute the mean curvature for $X(u,v) = \{\cos[u], \sin[u], v\}$ at the point $(u,v) = (1, 4)$.

- 1) $H(1, 4) = 0.5$
- 2) $H(1, 4) = -6.53552$
- 3) $H(1, 4) = -6.35637$
- 4) $H(1, 4) = 2.56606$
- 5) $H(1, 4) = 3.06991$

Further Mathematics - Degree in Engineering - 2024/2025

03-Differential Geometry-Hand exam for serial number: 34

Exercise 1

Compute the center of curvature for $C(t) = \{-t^2, 3t, t^2\}$ at the point $t=0$.

- 1) $\{-0.45, -1.8, 1.05\}$
- 2) $\{-3.65, -1., 1.65\}$
- 3) $\{-3.25, -0.2, 3.05\}$
- 4) $\{-2.85, -1.2, 1.25\}$
- 5) $\{-2.25, 0, 2.25\}$

Exercise 2

Compute the Gauss curvature for $X(u,v) = \{v \cos[u], v \sin[u], v\}$ at the point $(u,v) = (2, 9)$.

- 1) $K(2, 9) = 6.25608$
- 2) $K(2, 9) = -5.75908$
- 3) $K(2, 9) = 2.39958$
- 4) $K(2, 9) = 8.63415$
- 5) $K(2, 9) = 0$

Further Mathematics - Degree in Engineering - 2024/2025

03-Differential Geometry-Hand exam for serial number: 35

Exercise 1

Compute the center of curvature for $C(t) = \{2 + 2t, 3t^2, 2t^2\}$ at the point $t = 2$.

- 1) $\{-329.6, -25.3385, 3.70769\}$
- 2) $\{-103., 139.462, -119.892\}$
- 3) $\{-206., 36.4615, 24.3077\}$
- 4) $\{-185.4, -45.9385, -78.6923\}$
- 5) $\{-41.2, 201.262, -161.092\}$

Exercise 2

Compute the mean curvature for $X(u,v) = \{v^2 \cos[u], v^2 \sin[u], v\}$ at the point $(u,v) = (2, 1)$.

- 1) $H(2, 1) = 0.134164$
- 2) $H(2, 1) = -2.49482$
- 3) $H(2, 1) = -3.35299$
- 4) $H(2, 1) = -1.59542$
- 5) $H(2, 1) = 7.43592$

Further Mathematics - Degree in Engineering - 2024/2025

03-Differential Geometry-Hand exam for serial number: 36

Exercise 1

Compute the center of curvature for $C(t) = \{2 + t, -t^2, -2t^2\}$ at the point $t = 2$.

- 1) $\{-63.2, 51.1, 70.6\}$
- 2) $\{-63.2, 114.3, 23.2\}$
- 3) $\{-158., -12.1, -24.2\}$
- 4) $\{-15.8, -154.3, -103.2\}$
- 5) $\{-31.6, -122.7, 70.6\}$

Exercise 2

Compute the mean curvature for $X(u, v) = \{e^v \cos[u], e^v \sin[u], v\}$ at the point $(u, v) = (2, 3)$.

- 1) $H(2, 3) = -6.49462$
- 2) $H(2, 3) = 3.06072 \times 10^{-6}$
- 3) $H(2, 3) = 0.726684$
- 4) $H(2, 3) = 7.49256$
- 5) $H(2, 3) = -5.02315$

Further Mathematics - Degree in Engineering - 2024/2025 03-Differential Geometry-Hand exam for serial number: 37

Exercise 1

Compute the center of curvature for $C(t) = \{1 + 2t, 2t^2, 2t^3\}$ at the point $t = -2$.

- 1) $\{129., 24.5, 24.5\}$
- 2) $\{116.1, -14.2, -27.1\}$
- 3) $\{77.4, -52.9, -14.2\}$
- 4) $\{180.6, 76.1, -91.6\}$
- 5) $\{77.4, 127.7, 50.3\}$

Exercise 2

Compute the Gauss curvature for $X(u,v) = \{\cos[u], \sin[u], v\}$ at the point $(u,v) = (5, 2)$.

- 1) $K(5, 2) = -3.50118$
- 2) $K(5, 2) = 0$
- 3) $K(5, 2) = 5.32047$
- 4) $K(5, 2) = -6.90998$
- 5) $K(5, 2) = 2.76616$

Further Mathematics - Degree in Engineering - 2024/2025

03-Differential Geometry-Hand exam for serial number: 38

Exercise 1

Compute the center of curvature for $C(t) = \{2t^2, -1 + 2t, -t^2\}$ at the point $t = 2$.

- 1) $\{32.9, -56.7, 36.2\}$
- 2) $\{81.5, -129.6, -52.9\}$
- 3) $\{41., -153.9, 20.\}$
- 4) $\{24.8, -81., -12.4\}$
- 5) $\{73.4, -64.8, -77.2\}$

Exercise 2

Compute the mean curvature for $X(u,v) = \{v^2 \cos[u], v^2 \sin[u], v\}$ at the point $(u,v) = (4, 6)$.

- 1) $H(4, 6) = 6.56397$
- 2) $H(4, 6) = 4.13548$
- 3) $H(4, 6) = 0.000580682$
- 4) $H(4, 6) = 7.03279$
- 5) $H(4, 6) = -3.22433$

Further Mathematics - Degree in Engineering - 2024/2025 03-Differential Geometry-Hand exam for serial number: 39

Exercise 1

Compute the center of curvature for $C(t) = \{t^2, -3 + 3t, 2t^2\}$ at the point $t = -1$.

- 1) $\{9.5, 6.46667, 12.\}$
- 2) $\{10.2, 0.866667, 9.9\}$
- 3) $\{5.3, 5.76667, 13.4\}$
- 4) $\{3.9, 3.66667, 7.8\}$
- 5) $\{3.2, 0.166667, 3.6\}$

Exercise 2

Compute the mean curvature for $X(u,v) = \{\cos[u], \sin[u], v\}$ at the point $(u,v) = (0, 3)$.

- 1) $H(0, 3) = -7.18571$
- 2) $H(0, 3) = -8.38599$
- 3) $H(0, 3) = 0.5$
- 4) $H(0, 3) = -6.89313$
- 5) $H(0, 3) = -7.58549$

Further Mathematics - Degree in Engineering - 2024/2025

03-Differential Geometry-Hand exam for serial number: 40

Exercise 1

Compute the center of curvature for $C(t) = \{2 - 3t, 2t^2, -t^2\}$ at the point $t = -3$.

- 1) $\{-213.6, -33.2, -116.9\}$
- 2) $\{-106.8, 127., 25.5\}$
- 3) $\{-302.6, 91.4, -188.1\}$
- 4) $\{-71.2, 216., -99.1\}$
- 5) $\{-178., 55.8, -27.9\}$

Exercise 2

Compute the Gauss curvature for $X(u,v) = \{\cos[u], \sin[u], v\}$ at the point $(u,v) = (5, 3)$.

- 1) $K(5, 3) = 6.91175$
- 2) $K(5, 3) = -7.26083$
- 3) $K(5, 3) = 0$
- 4) $K(5, 3) = 3.83407$
- 5) $K(5, 3) = -4.64152$

Further Mathematics - Degree in Engineering - 2024/2025

03-Differential Geometry-Hand exam for serial number: 41

Exercise 1

Compute the center of curvature for $C(t) = \{-1 - 2t, 2t^2, -3t^2\}$ at the point $t = 2$.

- 1) $\{207., 24.3077, -36.4615\}$
- 2) $\{289.8, -37.7923, -181.362\}$
- 3) $\{186.3, 65.7077, 4.93846\}$
- 4) $\{393.3, -161.992, -139.962\}$
- 5) $\{186.3, -161.992, 87.7385\}$

Exercise 2

Compute the Gauss curvature for $X(u,v) = \{\cos[u], \sin[u], v\}$ at the point $(u,v) = (5, 2)$.

- 1) $K(5, 2) = 5.1809$
- 2) $K(5, 2) = 6.50995$
- 3) $K(5, 2) = 6.36239$
- 4) $K(5, 2) = -4.23619$
- 5) $K(5, 2) = 0$

Further Mathematics - Degree in Engineering - 2024/2025

03-Differential Geometry-Hand exam for serial number: 42

Exercise 1

Compute the center of curvature for $C(t) = \{3t^2, -2t^2, -2-2t\}$ at the point $t=1$.

- 1) $\{28.6615, -11.1077, 9.6\}$
- 2) $\{14.2615, 3.29231, 16.8\}$
- 3) $\{9.46154, -6.30769, 24.\}$
- 4) $\{26.2615, -13.5077, 31.2\}$
- 5) $\{23.8615, -23.1077, 43.2\}$

Exercise 2

Compute the Gauss curvature for $X(u,v) = \{\cos[u], \sin[u], v\}$ at the point $(u,v) = (3, 10)$.

- 1) $K(3, 10) = 1.03254$
- 2) $K(3, 10) = 3.48584$
- 3) $K(3, 10) = 4.30096$
- 4) $K(3, 10) = 0$
- 5) $K(3, 10) = 2.4389$

Further Mathematics - Degree in Engineering - 2024/2025
03-Differential Geometry-Hand exam for serial number: 43

Exercise 1

Compute the center of curvature for $C(t) = \{-t^2, -3t, -3t^2\}$ at the point $t=3$.

- 1) $\{260.55, 180., -190.35\}$
- 2) $\{-171.45, 252., 61.65\}$
- 3) $\{-27.45, 360., -82.35\}$
- 4) $\{260.55, 432., -46.35\}$
- 5) $\{8.55, 648., -298.35\}$

Exercise 2

Compute the Gauss curvature for $X(u,v) = \{e^v \cos[u], e^v \sin[u], v\}$ at the point $(u,v) = (1, 4)$.

- 1) $K(1, 4) = 7.22953$
- 2) $K(1, 4) = -1.1246 \times 10^{-7}$
- 3) $K(1, 4) = -3.58157$
- 4) $K(1, 4) = 0.741207$
- 5) $K(1, 4) = 8.21035$

Further Mathematics - Degree in Engineering - 2024/2025

03-Differential Geometry-Hand exam for serial number: 44

Exercise 1

Compute the center of curvature for $C(t) = \{-t^2, -1+t, t^2\}$ at the point $t = -1$.

- 1) $\{-3.25, 7., 3.25\}$
- 2) $\{-4.65, 2.1, -1.65\}$
- 3) $\{-6.75, 5.6, -3.05\}$
- 4) $\{-1.85, 11.2, 1.15\}$
- 5) $\{0.25, 11.9, 2.55\}$

Exercise 2

Compute the mean curvature for $X(u,v) = \{e^v \cos[u], e^v \sin[u], v\}$ at the point $(u,v) = (4, 5)$.

- 1) $H(4, 5) = 1.03051 \times 10^{-9}$
- 2) $H(4, 5) = 7.10103$
- 3) $H(4, 5) = -3.96802$
- 4) $H(4, 5) = 2.34339$
- 5) $H(4, 5) = -1.33915$

Further Mathematics - Degree in Engineering - 2024/2025

03-Differential Geometry-Hand exam for serial number: 45

Exercise 1

Compute the center of curvature for $C(t) = \{2t^2, t^2, 3+3t\}$ at the point $t = -2$.

- 1) $\{20.2, 7.3, 84.3333\}$
- 2) $\{42.6, -3.9, 45.1333\}$
- 3) $\{-7.8, 24.1, 11.5333\}$
- 4) $\{14.6, 40.9, 50.7333\}$
- 5) $\{25.8, 12.9, 56.3333\}$

Exercise 2

Compute the Gauss curvature for $X(u,v) = \{v \cos[u], v \sin[u], v\}$ at the point $(u,v) = (1, 10)$.

- 1) $K(1, 10) = 8.70067$
- 2) $K(1, 10) = -4.97879$
- 3) $K(1, 10) = 0$
- 4) $K(1, 10) = 1.14353$
- 5) $K(1, 10) = 5.76828$

Further Mathematics - Degree in Engineering - 2024/2025

03-Differential Geometry-Hand exam for serial number: 46

Exercise 1

Compute the center of curvature for $C(t) = \{-3 - 2t, -3t^2, 2t^2\}$ at the point $t = -1$.

- 1) $\{-40.6, -0.761538, -8.19231\}$
- 2) $\{-29., -9.46154, 6.30769\}$
- 3) $\{-46.4, -3.66154, 3.40769\}$
- 4) $\{-37.7, 5.03846, -2.39231\}$
- 5) $\{-23.2, 10.8385, 0.507692\}$

Exercise 2

Compute the mean curvature for $X(u,v) = \{\cos[u], \sin[u], v\}$ at the point $(u,v) = (6, 3)$.

- 1) $H(6, 3) = -3.91041$
- 2) $H(6, 3) = -4.36321$
- 3) $H(6, 3) = 0.5$
- 4) $H(6, 3) = -1.00907$
- 5) $H(6, 3) = -2.75273$

Further Mathematics - Degree in Engineering - 2024/2025 03-Differential Geometry-Hand exam for serial number: 47

Exercise 1

Compute the center of curvature for $C(t) = \{2t^2, -3 + 2t, -t^2\}$ at the point $t = 3$.

- 1) $\{-163.6, -27.3, 81.8\}$
- 2) $\{-136.3, -218.4, 163.7\}$
- 3) $\{-136.3, -464.1, -273.1\}$
- 4) $\{300.5, -354.9, -163.9\}$
- 5) $\{54.8, -273., -27.4\}$

Exercise 2

Compute the mean curvature for $X(u,v) = \{e^v \cos[u], e^v \sin[u], v\}$ at the point $(u,v) = (4, 7)$.

- 1) $H(4, 7) = -0.912055$
- 2) $H(4, 7) = 7.01027$
- 3) $H(4, 7) = 0$
- 4) $H(4, 7) = 5.89209$
- 5) $H(4, 7) = -5.27836$

Further Mathematics - Degree in Engineering - 2024/2025

03-Differential Geometry-Hand exam for serial number: 48

Exercise 1

Compute the center of curvature for $C(t) = \{-3 - 2t, 3t^2, 2t^2\}$ at the point $t = 2$.

- 1) $\{287., 179.962, -37.1923\}$
- 2) $\{205., 36.4615, 24.3077\}$
- 3) $\{246., -45.5385, -37.1923\}$
- 4) $\{164., 56.9615, -119.192\}$
- 5) $\{184.5, -25.0385, -119.192\}$

Exercise 2

Compute the Gauss curvature for $X(u,v) = \{\cos[u], \sin[u], v\}$ at the point $(u,v) = (3, 4)$.

- 1) $K(3, 4) = 8.26343$
- 2) $K(3, 4) = 4.8856$
- 3) $K(3, 4) = 0$
- 4) $K(3, 4) = 8.37377$
- 5) $K(3, 4) = 2.65569$

Further Mathematics - Degree in Engineering - 2024/2025

03-Differential Geometry-Hand exam for serial number: 49

Exercise 1

Compute the center of curvature for $C(t) = \{-2t^2, t^2, -1+2t\}$ at the point $t=3$.

- 1) $\{134.9, -135.2, -54.2\}$
- 2) $\{-54.8, 27.4, -271.\}$
- 3) $\{26.5, -108.1, -135.5\}$
- 4) $\{53.6, 217.1, -27.1\}$
- 5) $\{-163.2, 54.5, -27.1\}$

Exercise 2

Compute the mean curvature for $X(u,v) = \{\cos[u], \sin[u], v\}$ at the point $(u,v) = (6, 4)$.

- 1) $H(6, 4) = -6.37055$
- 2) $H(6, 4) = -6.64462$
- 3) $H(6, 4) = -6.07693$
- 4) $H(6, 4) = 0.5$
- 5) $H(6, 4) = -2.96958$

Further Mathematics - Degree in Engineering - 2024/2025
03-Differential Geometry-Hand exam for serial number: 50

Exercise 1

Compute the center of curvature for $C(t) = \{1 + 2t, -t^2, -t^2\}$ at the point $t = -1$.

- 1) $\{7.5, -4.5, -0.5\}$
- 2) $\{2.5, -3.5, -7.\}$
- 3) $\{6.5, -8.5, -1.\}$
- 4) $\{8.5, -1., -7.\}$
- 5) $\{5., -4., -4.\}$

Exercise 2

Compute the mean curvature for $X(u,v) = \{u, 2, v\}$ at the point $(u,v) = (8, 1)$.

- 1) $H(8, 1) = 0$
- 2) $H(8, 1) = -6.658$
- 3) $H(8, 1) = 7.12839$
- 4) $H(8, 1) = 2.06724$
- 5) $H(8, 1) = -2.04685$

Further Mathematics - Degree in Engineering - 2024/2025

03-Differential Geometry-Hand exam for serial number: 51

Exercise 1

Compute the center of curvature for $C(t) = \{-3t, t^2, -3t^2\}$ at the point $t=3$.

- 1) $\{324., -260.55, 133.65\}$
- 2) $\{216., -224.55, 241.65\}$
- 3) $\{360., 27.45, -82.35\}$
- 4) $\{648., 243.45, 241.65\}$
- 5) $\{144., -80.55, 133.65\}$

Exercise 2

Compute the Gauss curvature for $X(u,v) = \{v^2 \cos[u], v^2 \sin[u], v\}$ at the point $(u,v) = (2, 3)$.

- 1) $K(2, 3) = 7.67909$
- 2) $K(2, 3) = 2.17798$
- 3) $K(2, 3) = -0.000162324$
- 4) $K(2, 3) = -2.56145$
- 5) $K(2, 3) = -6.9679$

Further Mathematics - Degree in Engineering - 2024/2025

03-Differential Geometry-Hand exam for serial number: 52

Exercise 1

Compute the center of curvature for $C(t) = \{-t^2, 3t^2, 2+t\}$ at the point $t = -2$.

- 1) $\{148.95, -221.45, 483.\}$
- 2) $\{181.15, -189.25, 96.6\}$
- 3) $\{213.35, -189.25, 64.4\}$
- 4) $\{-12.05, 36.15, 322.\}$
- 5) $\{116.75, -221.45, 64.4\}$

Exercise 2

Compute the Gauss curvature for $X(u,v) = \{\cos[u], \sin[u], v\}$ at the point $(u,v) = (2, 9)$.

- 1) $K(2, 9) = 0$
- 2) $K(2, 9) = 1.82696$
- 3) $K(2, 9) = -8.22475$
- 4) $K(2, 9) = 3.28615$
- 5) $K(2, 9) = 5.20323$

Further Mathematics - Degree in Engineering - 2024/2025

03-Differential Geometry-Hand exam for serial number: 53

Exercise 1

Compute the center of curvature for $C(t) = \{2 - 3t, 2t^2, 2t^2\}$ at the point $t=1$.

- 1) $\{10.2667, -0.075, 8.325\}$
- 2) $\{17.4667, -1.275, 14.325\}$
- 3) $\{6.66667, 8.325, 1.125\}$
- 4) $\{5.46667, 8.325, 11.925\}$
- 5) $\{12.6667, 7.125, 7.125\}$

Exercise 2

Compute the Gauss curvature for $X(u,v) = \{\cos[u], \sin[u], v\}$ at the point $(u,v) = (4, 5)$.

- 1) $K(4, 5) = 7.12106$
- 2) $K(4, 5) = -5.86683$
- 3) $K(4, 5) = 0$
- 4) $K(4, 5) = -2.87178$
- 5) $K(4, 5) = -6.59159$

Further Mathematics - Degree in Engineering - 2024/2025

03-Differential Geometry-Hand exam for serial number: 54

Exercise 1

Compute the center of curvature for $C(t) = \{-2t^2, -t, t^2\}$ at the point $t=2$.

- 1) $\{119.8, 48., -3.9\}$
- 2) $\{7.8, 176., 76.1\}$
- 3) $\{55.8, 112., -3.9\}$
- 4) $\{-136.2, 128., -35.9\}$
- 5) $\{-24.2, 160., 12.1\}$

Exercise 2

Compute the mean curvature for $X(u,v) = \{2u, u^2, v\}$ at the point $(u,v) = (2, 9)$.

- 1) $H(2, 9) = -0.994745$
- 2) $H(2, 9) = -3.15171$
- 3) $H(2, 9) = -0.631055$
- 4) $H(2, 9) = 6.5311$
- 5) $H(2, 9) = 0.0223607$

Further Mathematics - Degree in Engineering - 2024/2025

03-Differential Geometry-Hand exam for serial number: 55

Exercise 1

Compute the center of curvature for $C(t) = \{3 - t, 2t^2, 3t^2\}$ at the point $t = -1$.

- 1) $\{-93.1, 50.1769, 4.21538\}$
- 2) $\{-53.9, 1.17692, -0.684615\}$
- 3) $\{-49., 6.07692, 9.11538\}$
- 4) $\{-58.8, 35.4769, 38.5154\}$
- 5) $\{-24.5, 1.17692, 38.5154\}$

Exercise 2

Compute the mean curvature for $X(u,v) = \{u, 3, v\}$ at the point $(u,v) = (3, 8)$.

- 1) $H(3, 8) = 5.74133$
- 2) $H(3, 8) = 3.54957$
- 3) $H(3, 8) = 0.663487$
- 4) $H(3, 8) = 2.41452$
- 5) $H(3, 8) = 0$

Further Mathematics - Degree in Engineering - 2024/2025
03-Differential Geometry-Hand exam for serial number: 56

Exercise 1

Compute the center of curvature for $C(t) = \{-1 + 2t, t^2, -3t^2\}$ at the point $t = -1$.

- 1) $\{24.7, -4.4, -13.4\}$
- 2) $\{19., 3.2, -9.6\}$
- 3) $\{28.5, -4.4, 3.7\}$
- 4) $\{7.6, -10.1, -5.8\}$
- 5) $\{34.2, 12.7, -11.5\}$

Exercise 2

Compute the mean curvature for $X(u,v) = \{\cos[u], \sin[u], v\}$ at the point $(u,v) = (3, 9)$.

- 1) $H(3, 9) = 0.5$
- 2) $H(3, 9) = -4.91205$
- 3) $H(3, 9) = 1.61375$
- 4) $H(3, 9) = 3.23887$
- 5) $H(3, 9) = -3.57232$

Further Mathematics - Degree in Engineering - 2024/2025
03-Differential Geometry-Hand exam for serial number: 57

Exercise 1

Compute the center of curvature for $C(t) = \{t^2, -t^2, 2+t\}$ at the point $t = -2$.

- 1) $\{38.65, 0.95, 39.6\}$
- 2) $\{12.25, -12.25, 66.\}$
- 3) $\{-47.15, 47.15, 92.4\}$
- 4) $\{18.85, 20.75, 59.4\}$
- 5) $\{71.65, 7.55, 13.2\}$

Exercise 2

Compute the mean curvature for $X(u,v) = \{v^2 \cos[u], v^2 \sin[u], v\}$ at the point $(u,v) = (3, 6)$.

- 1) $H(3, 6) = 0.000580682$
- 2) $H(3, 6) = 5.97369$
- 3) $H(3, 6) = -4.44509$
- 4) $H(3, 6) = 8.56991$
- 5) $H(3, 6) = 5.65875$

Further Mathematics - Degree in Engineering - 2024/2025

03-Differential Geometry-Hand exam for serial number: 58

Exercise 1

Compute the center of curvature for $C(t) = \{-t^2, 2t^2, 3-3t\}$ at the point $t = -2$.

- 1) $\{-2.9, 40.8, -40.3333\}$
- 2) $\{22.1, 40.8, -70.3333\}$
- 3) $\{-47.9, 15.8, -60.3333\}$
- 4) $\{-12.9, 25.8, -50.3333\}$
- 5) $\{17.1, 45.8, -55.3333\}$

Exercise 2

Compute the Gauss curvature for $X(u,v) = \{v \cos[u], v \sin[u], v\}$ at the point $(u,v) = (4, 8)$.

- 1) $K(4, 8) = 0$
- 2) $K(4, 8) = -8.91202$
- 3) $K(4, 8) = -1.70492$
- 4) $K(4, 8) = 6.0509$
- 5) $K(4, 8) = 6.71046$

Further Mathematics - Degree in Engineering - 2024/2025

03-Differential Geometry-Hand exam for serial number: 59

Exercise 1

Compute the center of curvature for $C(t) = \{2 - 3t, -2t^2, -3t^2\}$ at the point $t = -1$.

- 1) $\{-9.33333, -12.6923, -20.5385\}$
- 2) $\{-15.3333, -6.69231, -10.0385\}$
- 3) $\{-9.33333, -20.1923, 3.46154\}$
- 4) $\{-1.83333, -11.1923, -23.5385\}$
- 5) $\{-6.33333, -15.6923, -19.0385\}$

Exercise 2

Compute the Gauss curvature for $X(u,v) = \{v \cos[u], v \sin[u], v\}$ at the point $(u,v) = (1, 9)$.

- 1) $K(1, 9) = 0$
- 2) $K(1, 9) = 3.77047$
- 3) $K(1, 9) = -2.77727$
- 4) $K(1, 9) = 8.10279$
- 5) $K(1, 9) = -4.10767$

Further Mathematics - Degree in Engineering - 2024/2025

03-Differential Geometry-Hand exam for serial number: 60

Exercise 1

Compute the center of curvature for $C(t) = \{-2t^2, 2-t, 2t^2\}$ at the point $t=3$.

- 1) $\{-227.325, 606.2, 227.325\}$
- 2) $\{32.475, 1558.8, 833.525\}$
- 3) $\{-54.125, 866., 54.125\}$
- 4) $\{-227.325, 779.4, -552.075\}$
- 5) $\{119.075, 1212.4, 573.725\}$

Exercise 2

Compute the mean curvature for $X(u,v) = \{v \cos[u], v \sin[u], v\}$ at the point $(u,v) = (5, 6)$.

- 1) $H(5, 6) = 3.27433$
- 2) $H(5, 6) = -8.03175$
- 3) $H(5, 6) = -5.86584$
- 4) $H(5, 6) = 0.0589256$
- 5) $H(5, 6) = -3.48182$

Further Mathematics - Degree in Engineering - 2024/2025 03-Differential Geometry-Hand exam for serial number: 61

Exercise 1

Compute the center of curvature for $C(t) = \{1+t, -3t^2, -2t^2\}$ at the point $t=0$.

- 1) $\{0.6, 0.284615, 0.723077\}$
- 2) $\{1., -0.115385, -0.0769231\}$
- 3) $\{0.2, -0.615385, -0.576923\}$
- 4) $\{0.6, -0.515385, -0.276923\}$
- 5) $\{0.1, -0.715385, -0.776923\}$

Exercise 2

Compute the Gauss curvature for $X(u,v) = \{v^2 \cos[u], v^2 \sin[u], v\}$ at the point $(u,v) = (2, 7)$.

- 1) $K(2, 7) = -4.3546$
- 2) $K(2, 7) = -6.93673$
- 3) $K(2, 7) = 0.960782$
- 4) $K(2, 7) = -1.05172 \times 10^{-6}$
- 5) $K(2, 7) = 7.56005$

Further Mathematics - Degree in Engineering - 2024/2025

03-Differential Geometry-Hand exam for serial number: 62

Exercise 1

Compute the center of curvature for $C(t) = \{-3 + 2t, -2t^2, 3t^2\}$ at the point $t = 3$.

- 1) $\{-775.5, -618.308, 10.9615\}$
- 2) $\{-916.5, 298.192, 433.962\}$
- 3) $\{-705., -54.3077, 81.4615\}$
- 4) $\{-352.5, -406.808, 433.962\}$
- 5) $\{-493.5, 86.6923, 363.462\}$

Exercise 2

Compute the Gauss curvature for $X(u,v) = \{\cos[u], \sin[u], v\}$ at the point $(u,v) = (0, 10)$.

- 1) $K(0, 10) = -1.44747$
- 2) $K(0, 10) = -8.06506$
- 3) $K(0, 10) = 0$
- 4) $K(0, 10) = -8.34761$
- 5) $K(0, 10) = 6.06154$

Further Mathematics - Degree in Engineering - 2024/2025
03-Differential Geometry-Hand exam for serial number: 63

Exercise 1

Compute the center of curvature for $C(t) = \{1 - t, 2t^2, 3t^2\}$ at the point $t = 2$.

- 1) $\{750.6, -267.823, 119.515\}$
- 2) $\{125.1, 149.177, -255.785\}$
- 3) $\{208.5, 274.277, 77.8154\}$
- 4) $\{417., 24.0769, 36.1154\}$
- 5) $\{125.1, -351.223, -5.58462\}$

Exercise 2

Compute the Gauss curvature for $X(u,v) = \{\cos[u], \sin[u], v\}$ at the point $(u,v) = (3, 8)$.

- 1) $K(3, 8) = -6.97646$
- 2) $K(3, 8) = 0.76756$
- 3) $K(3, 8) = 1.9722$
- 4) $K(3, 8) = 8.75902$
- 5) $K(3, 8) = 0$

Further Mathematics - Degree in Engineering - 2024/2025
03-Differential Geometry-Hand exam for serial number: 64

Exercise 1

Compute the center of curvature for $C(t) = \{2 + 3t, -3t^2, -t^2\}$ at the point $t=1$.

- 1) $\{-13.5333, -4.85, -10.05\}$
- 2) $\{-19.0333, -16.95, -8.95\}$
- 3) $\{-17.9333, -19.15, -6.75\}$
- 4) $\{-8.03333, -9.25, -1.25\}$
- 5) $\{-11.3333, -10.35, -3.45\}$

Exercise 2

Compute the mean curvature for $X(u,v) = \{\cos[u], \sin[u], v\}$ at the point $(u,v) = (2, 10)$.

- 1) $H(2, 10) = 0.5$
- 2) $H(2, 10) = 1.10577$
- 3) $H(2, 10) = -7.23494$
- 4) $H(2, 10) = -7.08265$
- 5) $H(2, 10) = 2.30431$

Further Mathematics - Degree in Engineering - 2024/2025

03-Differential Geometry-Hand exam for serial number: 65

Exercise 1

Compute the center of curvature for $C(t) = \{-2 + 2t, -2t^2, -2t^2\}$ at the point $t=0$.

- 1) $\{-1.2, 0.9, -1.5\}$
- 2) $\{-1., 1.1, -2.1\}$
- 3) $\{-2., -0.5, -0.5\}$
- 4) $\{-1.2, -2.3, -0.9\}$
- 5) $\{-0.2, 0.1, -1.1\}$

Exercise 2

Compute the mean curvature for $X(u,v) = \{v \cos[u], v \sin[u], v\}$ at the point $(u,v) = (1, 6)$.

- 1) $H(1, 6) = -2.07438$
- 2) $H(1, 6) = 0.0589256$
- 3) $H(1, 6) = -5.74544$
- 4) $H(1, 6) = 7.21379$
- 5) $H(1, 6) = 4.37988$

Further Mathematics - Degree in Engineering - 2024/2025

03-Differential Geometry-Hand exam for serial number: 66

Exercise 1

Compute the center of curvature for $C(t) = \{2t^2, -3 - 3t, 2t^2\}$ at the point $t = -3$.

- 1) $\{258.825, -465.6, 171.525\}$
- 2) $\{287.925, -203.7, -90.375\}$
- 3) $\{-61.275, -378.3, -148.575\}$
- 4) $\{55.125, -291., 55.125\}$
- 5) $\{171.525, -145.5, 142.425\}$

Exercise 2

Compute the mean curvature for $X(u,v) = \{v \cos[u], v \sin[u], v\}$ at the point $(u,v) = (6, 10)$.

- 1) $H(6, 10) = 2.17633$
- 2) $H(6, 10) = 8.50384$
- 3) $H(6, 10) = -2.26824$
- 4) $H(6, 10) = -2.54526$
- 5) $H(6, 10) = 0.0353553$

Further Mathematics - Degree in Engineering - 2024/2025

03-Differential Geometry-Hand exam for serial number: 67

Exercise 1

Compute the center of curvature for $C(t) = \{-3t^2, -t^2, t\}$ at the point $t = -3$.

- 1) $\{134.85, 188.95, 972.\}$
- 2) $\{-81.15, -27.05, 1080.\}$
- 3) $\{-513.15, 296.95, 540.\}$
- 4) $\{-729.15, -999.05, 864.\}$
- 5) $\{-621.15, -675.05, 432.\}$

Exercise 2

Compute the Gauss curvature for $X(u,v) = \{e^v \cos[u], e^v \sin[u], v\}$ at the point $(u,v) = (5, 4)$.

- 1) $K(5, 4) = -2.37077$
- 2) $K(5, 4) = -0.56458$
- 3) $K(5, 4) = 2.89464$
- 4) $K(5, 4) = -4.66195$
- 5) $K(5, 4) = -1.1246 \times 10^{-7}$

Further Mathematics - Degree in Engineering - 2024/2025

03-Differential Geometry-Hand exam for serial number: 68

Exercise 1

Compute the center of curvature for $C(t) = \{3t, t^2, t^2\}$ at the point $t = -3$.

- 1) $\{43.2, 36.45, 65.25\}$
- 2) $\{72., 29.25, 29.25\}$
- 3) $\{100.8, 94.05, 50.85\}$
- 4) $\{57.6, 0.45, -28.35\}$
- 5) $\{129.6, 50.85, 0.45\}$

Exercise 2

Compute the mean curvature for $X(u,v) = \{3u, u^2, v\}$ at the point $(u,v) = (9, 10)$.

- 1) $H(9, 10) = 0.000493691$
- 2) $H(9, 10) = -5.75468$
- 3) $H(9, 10) = -0.57604$
- 4) $H(9, 10) = 2.55877$
- 5) $H(9, 10) = -1.70032$

Further Mathematics - Degree in Engineering - 2024/2025

03-Differential Geometry-Hand exam for serial number: 69

Exercise 1

Compute the center of curvature for $C(t) = \{2 - 2t, -t^2, 2t^2\}$ at the point $t = -2$.

- 1) $\{-39., 34.4, 87.2\}$
- 2) $\{-15.6, -82.6, 71.6\}$
- 3) $\{-31.2, 26.6, 48.2\}$
- 4) $\{-15.6, -4.6, 9.2\}$
- 5) $\{-78., -12.4, 24.8\}$

Exercise 2

Compute the mean curvature for $X(u,v) = \{u, 1, v\}$ at the point $(u,v) = (10, 7)$.

- 1) $H(10, 7) = 6.27982$
- 2) $H(10, 7) = -5.43778$
- 3) $H(10, 7) = 0$
- 4) $H(10, 7) = 3.82241$
- 5) $H(10, 7) = 8.4729$

Further Mathematics - Degree in Engineering - 2024/2025
03-Differential Geometry-Hand exam for serial number: 70

Exercise 1

Compute the center of curvature for $C(t) = \{3 - 2t, -3t^2, -2t^2\}$ at the point $t = 1$.

- 1) $\{8.7, -21.0615, 13.9923\}$
- 2) $\{52.2, 7.93846, 19.7923\}$
- 3) $\{29., -9.46154, -6.30769\}$
- 4) $\{11.6, 5.03846, -17.9077\}$
- 5) $\{17.4, 2.13846, -3.40769\}$

Exercise 2

Compute the mean curvature for $X(u,v) = \{v^2 \cos[u], v^2 \sin[u], v\}$ at the point $(u,v) = (1, 7)$.

- 1) $H(1, 7) = 2.21157$
- 2) $H(1, 7) = -6.33319$
- 3) $H(1, 7) = -3.58551$
- 4) $H(1, 7) = 0.000365351$
- 5) $H(1, 7) = -5.44056$

Further Mathematics - Degree in Engineering - 2024/2025

03-Differential Geometry-Hand exam for serial number: 71

Exercise 1

Compute the center of curvature for $C(t) = \{-t^2, -t^2, -3-3t\}$ at the point $t = -3$.

- 1) $\{-6.75, 0.75, -15.\}$
- 2) $\{-6.75, -59.25, -120.\}$
- 3) $\{15.75, 38.25, -112.5\}$
- 4) $\{-29.25, -29.25, -75.\}$
- 5) $\{-81.75, -96.75, -90.\}$

Exercise 2

Compute the mean curvature for $X(u,v) = \{v^2 \cos[u], v^2 \sin[u], v\}$ at the point $(u,v) = (4, 8)$.

- 1) $H(4, 8) = 0.000244613$
- 2) $H(4, 8) = -1.99133$
- 3) $H(4, 8) = 2.94768$
- 4) $H(4, 8) = 2.40582$
- 5) $H(4, 8) = 1.55164$

Further Mathematics - Degree in Engineering - 2024/2025

03-Differential Geometry-Hand exam for serial number: 72

Exercise 1

Compute the center of curvature for $C(t) = \{2 + t, 2t^2, -3t^2\}$ at the point $t = 3$.

- 1) $\{-2523.6, 755.077, 619.885\}$
- 2) $\{-560.8, -226.323, -1062.52\}$
- 3) $\{-1121.6, -646.923, -1342.92\}$
- 4) $\{-981.4, -86.1231, 1180.68\}$
- 5) $\{-1402., 54.0769, -81.1154\}$

Exercise 2

Compute the mean curvature for $X(u,v) = \{\cos[u], \sin[u], v\}$ at the point $(u,v) = (0, 2)$.

- 1) $H(0, 2) = 2.92841$
- 2) $H(0, 2) = -8.87676$
- 3) $H(0, 2) = 5.44508$
- 4) $H(0, 2) = -3.54728$
- 5) $H(0, 2) = 0.5$

Further Mathematics - Degree in Engineering - 2024/2025

03-Differential Geometry-Hand exam for serial number: 73

Exercise 1

Compute the center of curvature for $C(t) = \{t^2, -2t^2, -3-3t\}$ at the point $t = -2$.

- 1) $\{57.7, -20.2, -17.1333\}$
- 2) $\{-26.3, -20.2, -11.5333\}$
- 3) $\{57.7, 2.2, -78.7333\}$
- 4) $\{-20.7, -3.4, -11.5333\}$
- 5) $\{12.9, -25.8, -56.3333\}$

Exercise 2

Compute the mean curvature for $X(u,v) = \{\cos[u], \sin[u], v\}$ at the point $(u,v) = (2, 5)$.

- 1) $H(2, 5) = 0.5$
- 2) $H(2, 5) = -0.167277$
- 3) $H(2, 5) = -6.11852$
- 4) $H(2, 5) = 6.97204$
- 5) $H(2, 5) = 4.00192$

Further Mathematics - Degree in Engineering - 2024/2025

03-Differential Geometry-Hand exam for serial number: 74

Exercise 1

Compute the center of curvature for $C(t) = \{1 + 3t, 3t^2, -t^2\}$ at the point $t = -1$.

- 1) $\{7.33333, 0.55, -16.05\}$
- 2) $\{14.3333, 10.35, -3.45\}$
- 3) $\{12.9333, 13.15, 7.75\}$
- 4) $\{11.5333, 4.75, 9.15\}$
- 5) $\{3.13333, 4.75, -14.65\}$

Exercise 2

Compute the mean curvature for $X(u,v) = \{v \cos[u], v \sin[u], v\}$ at the point $(u,v) = (2, 9)$.

- 1) $H(2, 9) = 6.41589$
- 2) $H(2, 9) = 1.56421$
- 3) $H(2, 9) = 1.65208$
- 4) $H(2, 9) = -6.85951$
- 5) $H(2, 9) = 0.0392837$

Further Mathematics - Degree in Engineering - 2024/2025

03-Differential Geometry-Hand exam for serial number: 75

Exercise 1

Compute the center of curvature for $C(t) = \{-3t^2, t^2, 3+2t\}$ at the point $t=2$.

- 1) $\{89., 90.7, -15.7\}$
- 2) $\{-83.7, 122.1, -15.7\}$
- 3) $\{-130.8, -34.9, -15.7\}$
- 4) $\{-162.2, 27.9, -109.9\}$
- 5) $\{-36.6, 12.2, -157.\}$

Exercise 2

Compute the mean curvature for $X(u,v) = \{\cos[u], \sin[u], v\}$ at the point $(u,v) = (1, 9)$.

- 1) $H(1, 9) = -4.02761$
- 2) $H(1, 9) = 0.5$
- 3) $H(1, 9) = -1.20937$
- 4) $H(1, 9) = -0.483552$
- 5) $H(1, 9) = -8.16362$

Further Mathematics - Degree in Engineering - 2024/2025

03-Differential Geometry-Hand exam for serial number: 76

Exercise 1

Compute the center of curvature for $C(t) = \{-3t^2, -3 + 3t, -2t^2\}$ at the point $t = -3$.

- 1) $\{-268.038, 558., 38.3077\}$
- 2) $\{57.4615, 837., 363.808\}$
- 3) $\{-175.038, 139.5, 177.808\}$
- 4) $\{-82.0385, 465., -54.6923\}$
- 5) $\{103.962, 651., 270.808\}$

Exercise 2

Compute the mean curvature for $X(u,v) = \{e^v \cos[u], e^v \sin[u], v\}$ at the point $(u,v) = (6, 10)$.

- 1) $H(6, 10) = -3.28669$
- 2) $H(6, 10) = 1.89213$
- 3) $H(6, 10) = 0$
- 4) $H(6, 10) = -7.47324$
- 5) $H(6, 10) = 7.47025$

Further Mathematics - Degree in Engineering - 2024/2025 03-Differential Geometry-Hand exam for serial number: 77

Exercise 1

Compute the center of curvature for $C(t) = \{-2t^2, -2t^2, 1-t\}$ at the point $t = -1$.

- 1) $\{18.675, -34.025, -46.5\}$
- 2) $\{12.475, -12.325, -49.6\}$
- 3) $\{9.375, -27.825, -58.9\}$
- 4) $\{-34.025, -34.025, -18.6\}$
- 5) $\{-6.125, -6.125, -31.\}$

Exercise 2

Compute the Gauss curvature for $X(u,v) = \{e^v \cos[u], e^v \sin[u], v\}$ at the point $(u,v) = (6, 10)$.

- 1) $K(6, 10) = 2.08112$
- 2) $K(6, 10) = -4.24007$
- 3) $K(6, 10) = -6.62219$
- 4) $K(6, 10) = 0$
- 5) $K(6, 10) = -1.15521$

Further Mathematics - Degree in Engineering - 2024/2025

03-Differential Geometry-Hand exam for serial number: 78

Exercise 1

Compute the center of curvature for $C(t) = \{-3 - 2t, -t^2, -2t^2\}$ at the point $t=1$.

- 1) $\{11.9, -8.3, -4.7\}$
- 2) $\{10.5, 0.1, -8.9\}$
- 3) $\{7., -3.4, -6.8\}$
- 4) $\{4.2, -5.5, -8.2\}$
- 5) $\{11.9, -9.7, -8.2\}$

Exercise 2

Compute the Gauss curvature for $X(u,v) = \{\cos[u], \sin[u], v\}$ at the point $(u,v) = (2, 6)$.

- 1) $K(2, 6) = -2.52568$
- 2) $K(2, 6) = 5.56666$
- 3) $K(2, 6) = 7.5803$
- 4) $K(2, 6) = 0$
- 5) $K(2, 6) = -0.852353$

Further Mathematics - Degree in Engineering - 2024/2025 03-Differential Geometry-Hand exam for serial number: 79

Exercise 1

Compute the center of curvature for $C(t) = \{t, -t^2, -t^2\}$ at the point $t = -2$.

- 1) $\{121.6, 45.35, -57.05\}$
- 2) $\{76.8, -50.65, 32.55\}$
- 3) $\{32., -44.25, -5.85\}$
- 4) $\{64., -12.25, -12.25\}$
- 5) $\{108.8, -57.05, -5.85\}$

Exercise 2

Compute the Gauss curvature for $X(u,v) = \{u, 2u^2, v\}$ at the point $(u,v) = (5, 9)$.

- 1) $K(5, 9) = 6.30026$
- 2) $K(5, 9) = -0.638461$
- 3) $K(5, 9) = 6.39801$
- 4) $K(5, 9) = -3.42129$
- 5) $K(5, 9) = 0$

Further Mathematics - Degree in Engineering - 2024/2025

03-Differential Geometry-Hand exam for serial number: 80

Exercise 1

Compute the center of curvature for $C(t) = \{3 + 2t, -3t^2, 3t^2\}$ at the point $t = -2$.

- 1) $\{116.4, -181.833, -167.367\}$
- 2) $\{291., -36.3333, 36.3333\}$
- 3) $\{174.6, -152.733, 65.4333\}$
- 4) $\{407.4, -240.033, 7.23333\}$
- 5) $\{378.3, -269.133, 123.633\}$

Exercise 2

Compute the Gauss curvature for $X(u,v) = \{\cos[u], \sin[u], v\}$ at the point $(u,v) = (4, 4)$.

- 1) $K(4, 4) = 0$
- 2) $K(4, 4) = 7.27348$
- 3) $K(4, 4) = 5.44666$
- 4) $K(4, 4) = 3.41545$
- 5) $K(4, 4) = 4.47112$

Further Mathematics - Degree in Engineering - 2024/2025 03-Differential Geometry-Hand exam for serial number: 81

Exercise 1

Compute the center of curvature for $C(t) = \{2t^2, -2 - 3t, 2t^2\}$ at the point $t = 3$.

- 1) $\{169.525, 114.4, -173.675\}$
- 2) $\{-202.275, 429., 226.725\}$
- 3) $\{169.525, 85.8, -116.475\}$
- 4) $\{83.725, 400.4, -145.075\}$
- 5) $\{55.125, 286., 55.125\}$

Exercise 2

Compute the Gauss curvature for $X(u,v) = \{e^v \cos[u], e^v \sin[u], v\}$ at the point $(u,v) = (6, 5)$.

- 1) $K(6, 5) = -2.39303$
- 2) $K(6, 5) = -2.06097 \times 10^{-9}$
- 3) $K(6, 5) = -6.7609$
- 4) $K(6, 5) = 4.63573$
- 5) $K(6, 5) = 5.6592$

Further Mathematics - Degree in Engineering - 2024/2025

03-Differential Geometry-Hand exam for serial number: 82

Exercise 1

Compute the center of curvature for $C(t) = \{-t^2, -3t^2, -3-2t\}$ at the point $t=1$.

- 1) $\{-3.2, -9.6, 17.\}$
- 2) $\{3.6, 2.3, 3.4\}$
- 3) $\{-6.6, -4.5, 15.3\}$
- 4) $\{10.4, -13., 13.6\}$
- 5) $\{-1.5, -16.4, 10.2\}$

Exercise 2

Compute the Gauss curvature for $X(u,v) = \{\cos[u], \sin[u], v\}$ at the point $(u,v) = (0, 1)$.

- 1) $K(0, 1) = 1.75382$
- 2) $K(0, 1) = 4.96589$
- 3) $K(0, 1) = -5.37023$
- 4) $K(0, 1) = 0$
- 5) $K(0, 1) = -4.09505$

Further Mathematics - Degree in Engineering - 2024/2025 03-Differential Geometry-Hand exam for serial number: 83

Exercise 1

Compute the center of curvature for $C(t) = \{-1 + 3t, 2t^2, 3t^2\}$ at the point $t = -1$.

- 1) $\{16.3333, 6.69231, 10.0385\}$
- 2) $\{24.3333, 17.8923, 2.03846\}$
- 3) $\{3.53333, -6.10769, 14.8385\}$
- 4) $\{25.9333, -7.70769, 16.4385\}$
- 5) $\{3.53333, 11.4923, 14.8385\}$

Exercise 2

Compute the mean curvature for $X(u,v) = \{v \cos[u], v \sin[u], v\}$ at the point $(u,v) = (6, 3)$.

- 1) $H(6, 3) = -1.19443$
- 2) $H(6, 3) = -7.16583$
- 3) $H(6, 3) = -0.696479$
- 4) $H(6, 3) = 4.04464$
- 5) $H(6, 3) = 0.117851$

Further Mathematics - Degree in Engineering - 2024/2025
03-Differential Geometry-Hand exam for serial number: 84

Exercise 1

Compute the center of curvature for $C(t) = \{2 - 3t, -t^2, t^2\}$ at the point $t = 3$.

- 1) $\{14.8, -81.05, 14.45\}$
- 2) $\{96.2, -58.85, 44.05\}$
- 3) $\{118.4, -44.05, 44.05\}$
- 4) $\{74., -29.25, 29.25\}$
- 5) $\{96.2, 15.15, -0.35\}$

Exercise 2

Compute the mean curvature for $X(u,v) = \{2u, 3, v\}$ at the point $(u,v) = (9, 1)$.

- 1) $H(9, 1) = 1.51572$
- 2) $H(9, 1) = 3.7831$
- 3) $H(9, 1) = -6.87154$
- 4) $H(9, 1) = 0$
- 5) $H(9, 1) = 8.04821$

Further Mathematics - Degree in Engineering - 2024/2025

03-Differential Geometry-Hand exam for serial number: 85

Exercise 1

Compute the center of curvature for $C(t) = \{-t, t^2, t^2\}$ at the point $t=1$.

- 1) $\{8., 3.25, 3.25\}$
- 2) $\{9.6, 4.05, 2.45\}$
- 3) $\{12., -0.75, -3.95\}$
- 4) $\{8.8, 6.45, -2.35\}$
- 5) $\{6.4, 0.05, -0.75\}$

Exercise 2

Compute the Gauss curvature for $X(u,v) = \{e^v \cos[u], e^v \sin[u], v\}$ at the point $(u,v) = (4, 1)$.

- 1) $K(4, 1) = 5.15152$
- 2) $K(4, 1) = -1.82034$
- 3) $K(4, 1) = -8.5088$
- 4) $K(4, 1) = -8.73539$
- 5) $K(4, 1) = -0.0142093$

Further Mathematics - Degree in Engineering - 2024/2025
03-Differential Geometry-Hand exam for serial number: 86

Exercise 1

Compute the center of curvature for $C(t) = \{-t^2, 2t^2, -3-3t\}$ at the point $t=1$.

- 1) $\{-1.1, 1.5, 0.866667\}$
- 2) $\{-3.9, 7.8, 3.66667\}$
- 3) $\{-1.1, 12.7, 5.06667\}$
- 4) $\{-10.2, 5.7, 8.56667\}$
- 5) $\{-6., 12., 1.56667\}$

Exercise 2

Compute the mean curvature for $X(u,v) = \{\cos[u], \sin[u], v\}$ at the point $(u,v) = (3, 9)$.

- 1) $H(3, 9) = -0.116796$
- 2) $H(3, 9) = -2.80153$
- 3) $H(3, 9) = -3.24839$
- 4) $H(3, 9) = 4.99715$
- 5) $H(3, 9) = 0.5$

Further Mathematics - Degree in Engineering - 2024/2025 03-Differential Geometry-Hand exam for serial number: 87

Exercise 1

Compute the center of curvature for $C(t) = \{2t^2, -t, 2t^2\}$ at the point $t=2$.

- 1) $\{24.125, 256., 24.125\}$
- 2) $\{152.125, 409.6, -52.675\}$
- 3) $\{49.725, 102.4, 203.325\}$
- 4) $\{203.325, 384., 152.125\}$
- 5) $\{-206.275, 102.4, 152.125\}$

Exercise 2

Compute the mean curvature for $X(u,v) = \{\cos[u], \sin[u], v\}$ at the point $(u,v) = (3, 9)$.

- 1) $H(3, 9) = 1.54076$
- 2) $H(3, 9) = 0.5$
- 3) $H(3, 9) = 1.27372$
- 4) $H(3, 9) = 7.89093$
- 5) $H(3, 9) = -1.46953$

Further Mathematics - Degree in Engineering - 2024/2025

03-Differential Geometry-Hand exam for serial number: 88

Exercise 1

Compute the center of curvature for $C(t) = \{2t^2, 3+t, 3t^2\}$ at the point $t=2$.

- 1) $\{189.277, -289.1, 407.815\}$
- 2) $\{354.477, -330.4, -252.985\}$
- 3) $\{-141.123, -578.2, -5.18462\}$
- 4) $\{-182.423, -247.8, 77.4154\}$
- 5) $\{24.0769, -413., 36.1154\}$

Exercise 2

Compute the mean curvature for $X(u,v) = \{\cos[u], \sin[u], v\}$ at the point $(u,v) = (5, 10)$.

- 1) $H(5, 10) = 3.8293$
- 2) $H(5, 10) = -4.46713$
- 3) $H(5, 10) = -8.43977$
- 4) $H(5, 10) = 4.82302$
- 5) $H(5, 10) = 0.5$

Further Mathematics - Degree in Engineering - 2024/2025 03-Differential Geometry-Hand exam for serial number: 89

Exercise 1

Compute the center of curvature for $C(t) = \{-3 - 2t, 3t^2, 2t^2\}$ at the point $t = 2$.

- 1) $\{205., 36.4615, 24.3077\}$
- 2) $\{82., 138.962, -98.6923\}$
- 3) $\{307.5, -4.53846, -37.1923\}$
- 4) $\{143.5, 97.9615, -16.6923\}$
- 5) $\{307.5, 118.462, -78.1923\}$

Exercise 2

Compute the mean curvature for $X(u,v) = \{3u, 3u, v\}$ at the point $(u,v) = (3, 2)$.

- 1) $H(3, 2) = -7.73223$
- 2) $H(3, 2) = -8.67412$
- 3) $H(3, 2) = 0$
- 4) $H(3, 2) = -7.99212$
- 5) $H(3, 2) = -5.37069$

Further Mathematics - Degree in Engineering - 2024/2025

03-Differential Geometry-Hand exam for serial number: 90

Exercise 1

Compute the center of curvature for $C(t) = \{-3 - 2t, t^2, -3t^2\}$ at the point $t = -2$.

- 1) $\{-81.5, -118.2, 77.5\}$
- 2) $\{-244.5, 110., 44.9\}$
- 3) $\{-130.4, 158.9, 77.5\}$
- 4) $\{-81.5, -20.4, -150.7\}$
- 5) $\{-163., 12.2, -36.6\}$

Exercise 2

Compute the Gauss curvature for $X(u,v) = \{2u, 3, v\}$ at the point $(u,v) = (5, 4)$.

- 1) $K(5, 4) = -6.33338$
- 2) $K(5, 4) = 3.81113$
- 3) $K(5, 4) = 7.45316$
- 4) $K(5, 4) = 0$
- 5) $K(5, 4) = 1.80689$

Further Mathematics - Degree in Engineering - 2024/2025

03-Differential Geometry-Hand exam for serial number: 91

Exercise 1

Compute the center of curvature for $C(t) = \{2 - t, t^2, t^2\}$ at the point $t = 2$.

- 1) $\{72.6, 32.05, 18.85\}$
- 2) $\{92.4, 25.45, 38.65\}$
- 3) $\{39.6, -14.15, 58.45\}$
- 4) $\{66., 12.25, 12.25\}$
- 5) $\{125.4, 25.45, -27.35\}$

Exercise 2

Compute the Gauss curvature for $X(u,v) = \{u, 2u, v\}$ at the point $(u,v) = (8, 6)$.

- 1) $K(8, 6) = -2.62944$
- 2) $K(8, 6) = 5.90342$
- 3) $K(8, 6) = 3.6365$
- 4) $K(8, 6) = 0$
- 5) $K(8, 6) = 8.5$

Further Mathematics - Degree in Engineering - 2024/2025

03-Differential Geometry-Hand exam for serial number: 92

Exercise 1

Compute the center of curvature for $C(t) = \{-t^2, -2+t, -2t^2\}$ at the point $t=0$.

- 1) $\{0.5, -2.8, 0.8\}$
- 2) $\{-1.7, -3.6, 1.6\}$
- 3) $\{-1.5, -0.4, -0.6\}$
- 4) $\{-0.1, -2., -0.2\}$
- 5) $\{-0.9, -3., 1.6\}$

Exercise 2

Compute the mean curvature for $X(u,v) = \{u, 1, v\}$ at the point $(u,v) = (9, 3)$.

- 1) $H(9, 3) = 0$
- 2) $H(9, 3) = 4.40529$
- 3) $H(9, 3) = 7.53989$
- 4) $H(9, 3) = 6.76641$
- 5) $H(9, 3) = -0.749251$

Further Mathematics - Degree in Engineering - 2024/2025
03-Differential Geometry-Hand exam for serial number: 93

Exercise 1

Compute the center of curvature for $C(t) = \{2t^2, 2+3t, -2t^2\}$ at the point $t=2$.

- 1) $\{91.525, -41.8333, -58.325\}$
- 2) $\{0.225, -124.833, -58.325\}$
- 3) $\{58.325, -108.233, 41.275\}$
- 4) $\{25.125, -83.3333, -25.125\}$
- 5) $\{-41.275, -158.033, -58.325\}$

Exercise 2

Compute the mean curvature for $X(u,v) = \{v \cos[u], v \sin[u], v\}$ at the point $(u,v) = (4, 4)$.

- 1) $H(4, 4) = 6.62644$
- 2) $H(4, 4) = -4.2536$
- 3) $H(4, 4) = 0.0883883$
- 4) $H(4, 4) = 6.58401$
- 5) $H(4, 4) = 4.62992$

Further Mathematics - Degree in Engineering - 2024/2025

03-Differential Geometry-Hand exam for serial number: 94

Exercise 1

Compute the center of curvature for $C(t) = \{3t^2, -t^2, -t\}$ at the point $t=0$.

- 1) $\{-0.55, -0.75, -0.3\}$
- 2) $\{0.15, -0.05, 0\}$
- 3) $\{0.85, 0.15, 0.2\}$
- 4) $\{0.35, 0.25, -0.3\}$
- 5) $\{-0.45, 0.15, 0.8\}$

Exercise 2

Compute the mean curvature for $X(u,v) = \{e^v \cos[u], e^v \sin[u], v\}$ at the point $(u,v) = (3, 1)$.

- 1) $H(3, 1) = -4.95991$
- 2) $H(3, 1) = 5.08481$
- 3) $H(3, 1) = 0.00757017$
- 4) $H(3, 1) = 2.1555$
- 5) $H(3, 1) = -5.38185$

Further Mathematics - Degree in Engineering - 2024/2025
03-Differential Geometry-Hand exam for serial number: 95

Exercise 1

Compute the center of curvature for $C(t) = \{2t^2, -3t^2, 1-2t\}$ at the point $t=2$.

- 1) $\{24.3077, -36.4615, 209.\}$
- 2) $\{212.408, -203.662, 83.6\}$
- 3) $\{-142.892, -99.1615, 250.8\}$
- 4) $\{66.1077, -203.662, 292.6\}$
- 5) $\{128.808, 109.838, 41.8\}$

Exercise 2

Compute the mean curvature for $X(u,v) = \{v \cos[u], v \sin[u], v\}$ at the point $(u,v) = (4, 5)$.

- 1) $H(4, 5) = 4.72193$
- 2) $H(4, 5) = 0.0707107$
- 3) $H(4, 5) = 6.81481$
- 4) $H(4, 5) = -4.57821$
- 5) $H(4, 5) = 7.61788$

Further Mathematics - Degree in Engineering - 2024/2025

03-Differential Geometry-Hand exam for serial number: 96

Exercise 1

Compute the center of curvature for $C(t) = \{2t^2, -2t^2, 2-3t\}$ at the point $t=1$.

- 1) $\{3.525, -11.925, 7.86667\}$
- 2) $\{3.525, -9.525, 5.46667\}$
- 3) $\{11.925, -4.725, 23.4667\}$
- 4) $\{7.125, -7.125, 12.6667\}$
- 5) $\{10.725, 2.475, 11.4667\}$

Exercise 2

Compute the mean curvature for $X(u,v) = \{\cos[u], \sin[u], v\}$ at the point $(u,v) = (1, 2)$.

- 1) $H(1, 2) = 5.22446$
- 2) $H(1, 2) = 0.5$
- 3) $H(1, 2) = 5.59493$
- 4) $H(1, 2) = -4.96998$
- 5) $H(1, 2) = 6.60936$

Further Mathematics - Degree in Engineering - 2024/2025

03-Differential Geometry-Hand exam for serial number: 97

Exercise 1

Compute the center of curvature for $C(t) = \{1+t, 3t^2, t^2\}$ at the point $t=0$.

- 1) $\{0.7, 0.85, -0.35\}$
- 2) $\{1.6, -0.45, -0.05\}$
- 3) $\{0.4, -0.55, -0.05\}$
- 4) $\{1., 0.15, 0.05\}$
- 5) $\{1.7, 0.45, -0.55\}$

Exercise 2

Compute the mean curvature for $X(u,v) = \{3u, u, v\}$ at the point $(u,v) = (7, 2)$.

- 1) $H(7, 2) = -4.01854$
- 2) $H(7, 2) = -3.44923$
- 3) $H(7, 2) = 0$
- 4) $H(7, 2) = 6.29554$
- 5) $H(7, 2) = -6.64719$

Further Mathematics - Degree in Engineering - 2024/2025

03-Differential Geometry-Hand exam for serial number: 98

Exercise 1

Compute the center of curvature for $C(t) = \{t^2, -t^2, -2 - 3t\}$ at the point $t = -2$.

- 1) $\{14.25, -14.25, -23.3333\}$
- 2) $\{-1.85, -28.05, -9.53333\}$
- 3) $\{28.05, -23.45, -34.8333\}$
- 4) $\{7.35, 1.85, -32.5333\}$
- 5) $\{18.85, 4.15, -25.6333\}$

Exercise 2

Compute the Gauss curvature for $X(u,v) = \{\cos[u], \sin[u], v\}$ at the point $(u,v) = (4, 7)$.

- 1) $K(4, 7) = 0$
- 2) $K(4, 7) = 0.871231$
- 3) $K(4, 7) = -5.74926$
- 4) $K(4, 7) = 4.43348$
- 5) $K(4, 7) = -4.56933$

Further Mathematics - Degree in Engineering - 2024/2025 03-Differential Geometry-Hand exam for serial number: 99

Exercise 1

Compute the center of curvature for $C(t) = \{3t^2, 1-2t, -t^2\}$ at the point $t = -2$.

- 1) $\{116.1, -238.5, 35.5\}$
- 2) $\{-58.8, -174.9, 99.1\}$
- 3) $\{132., -47.7, -123.5\}$
- 4) $\{36.6, -159., -12.2\}$
- 5) $\{179.7, -190.8, 3.7\}$

Exercise 2

Compute the Gauss curvature for $X(u,v) = \{\cos[u], \sin[u], v\}$ at the point $(u,v) = (6, 5)$.

- 1) $K(6, 5) = 4.3782$
- 2) $K(6, 5) = 0$
- 3) $K(6, 5) = -5.82$
- 4) $K(6, 5) = -2.46851$
- 5) $K(6, 5) = 2.35821$

Further Mathematics - Degree in Engineering - 2024/2025
03-Differential Geometry-Hand exam for serial number: 100

Exercise 1

Compute the center of curvature for $C(t) = \{-3 - 2t, -t^2, -3t^2\}$ at the point $t = -1$.

- 1) $\{-43.7, 3.7, 1.9\}$
- 2) $\{-34.5, -12.4, 6.5\}$
- 3) $\{-18.4, 15.2, -5.\}$
- 4) $\{-43.7, -14.7, -5.\}$
- 5) $\{-23., -3.2, -9.6\}$

Exercise 2

Compute the Gauss curvature for $X(u,v) = \{\cos[u], \sin[u], v\}$ at the point $(u,v) = (3, 9)$.

- 1) $K(3, 9) = 0$
- 2) $K(3, 9) = 3.02548$
- 3) $K(3, 9) = -7.39943$
- 4) $K(3, 9) = 4.16021$
- 5) $K(3, 9) = 2.48569$