Further Mathematics - 2023/2024
Chapter 3 - Test for serial number: 1

Exercise 1

Compute the torsion for $C(t) = \{Cos[t], -t + 3 Sin[t], t - 2 Sin[t]\}$ at the point t=5.

1) $\tau(5)$ = 3.65616

2) $\tau(5)$ = 4.15702

3) $\tau(5)$ = 3.21324

4) $\tau(5)$ = -7.91799

5) $\tau(5)$ = 0.0889376

Exercise 2

Compute the Gauss curvature for $X(u,v) =$
$\left\{ 5 - u^2 - 3u(-1 + v) - 2v - 4v^2, v, -5 + u^2 + 4v + 4v^2 + u(-2 + 3v) \right\}$ at the point $(u,v) = (1,-2)$.

1) $K(1,-2)$ = 0.000792214

2) $K(1,-2)$ = -2.75801

3) $K(1,-2)$ = -6.74171

4) $K(1,-2)$ = -6.02298

5) $K(1,-2)$ = 0.99976

Exercise 3

Compute the mean curvature for $X(u,v) = \left\{ 2u, u^2, v \right\}$ at the point $(u,v) = (3,5)$.

1) $H(3,5)$ = -4.51036

2) $H(3,5)$ = -4.18897

3) $H(3,5)$ = 0.00790569

4) $H(3,5)$ = 7.77145

5) $H(3,5)$ = -7.19602

Further Mathematics - 2023/2024
Chapter 3 - Test for serial number: 2

Exercise 1

Compute the curvature for $C(t) = \{t, 1 - 9t + 3t^2, -4 - 20t + 2t^2\}$ at the point t=4.

1) k(4) = 5.06001

2) k(4) = 8.74726

3) k(4) = 0.022395

4) k(4) = 4.30114

5) k(4) = -8.01739

Exercise 2

Compute the mean curvature for X(u,v) =
$\{-7v - 3\cos[u], -2v + \sin[u], 2v + \cos[u]\}$ at the point (u,v) = (6,1).

1) H(6,1) = -8.59959

2) H(6,1) = 1.39956

3) H(6,1) = -4.29358

4) H(6,1) = 0.0423902

5) H(6,1) = 8.97357

Exercise 3

Compute the mean curvature for X(u,v) = {Cos[u], Sin[u], v} at the point (u,v) = (0,10).

1) H(0,10) = -7.14296

2) H(0,10) = -0.919774

3) H(0,10) = 6.79931

4) H(0,10) = -3.96272

5) H(0,10) = 0.5

Further Mathematics - 2023/2024
Chapter 3 - Test for serial number: 3

Exercise 1

Compute the curvature for $C(t) = \{-9t + \text{Cos}[t] + 4\,\text{Sin}[t], -3t + \text{Sin}[t], 3t\}$ at the point t=6.

1) k(6) = -1.8838

2) k(6) = -1.22152

3) k(6) = -1.03361

4) k(6) = 8.81151

5) k(6) = 0.00630936

Exercise 2

Compute the Gauss curvature for $X(u,v) =$
$\{8 - 8u^2 - 9v - 3v^2 - 8u(1+v), -8 + 8u^2 + 10v + 3v^2 + u(9 + 8v), u\}$ at the point $(u,v) = (-3,-3)$.

1) K(-3,-3) = 4.86658

2) K(-3,-3) = 5.49184

3) K(-3,-3) = 1.25727

4) K(-3,-3) = -7.21705

5) K(-3,-3) = 3.38643×10^{-6}

Exercise 3

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

1) K(3,4) = 5.10863

2) K(3,4) = 0

3) K(3,4) = 4.3145

4) K(3,4) = -2.75765

5) K(3,4) = -8.74495

Further Mathematics - 2023/2024
Chapter 3 - Test for serial number: 4

Exercise 1

Compute the curvature for $C(t) =$
$\{8 + 10\,t - 3\,t^2,\ 10 + 13\,t - t^2,\ -3\,t - 2\,(2 + 5\,t + 2\,t^2) + 4\,(-8 - 8\,t + 3\,t^2)\}$ at the point t=1.

1) k(1) = -1.75245

2) k(1) = 2.50753

3) k(1) = -6.55833

4) k(1) = -2.28494

5) k(1) = 0.00560501

Exercise 2

Compute the mean curvature for $X(u,v) =$
$\{\text{Cos}[u],\ \text{Cos}[u] + \text{Sin}[u],\ v + 2\,\text{Cos}[u] + \text{Sin}[u]\}$ at the point (u,v)=(1,-7).

1) H(1,-7) = 0.700378

2) H(1,-7) = 8.90522

3) H(1,-7) = -8.62147

4) H(1,-7) = 3.07162

5) H(1,-7) = 4.44392

Exercise 3

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

1) H(5,10) = -5.25221

2) H(5,10) = -0.29238

3) H(5,10) = 0.5

4) H(5,10) = 1.32649

5) H(5,10) = 2.72631

Further Mathematics - 2023/2024
Chapter 3 - Test for serial number: 5

Exercise 1

Compute the curvature for C(t) =
  {-6 t + 2 Cos[t] - 3 Sin[t], -Cos[t] + 2 Sin[t], 3 t + Cos[t] - 2 Sin[t]} at the point t=2.

1) k(2) = -5.09433

2) k(2) = -2.21574

3) k(2) = 8.92735

4) k(2) = 1.04288

5) k(2) = 0.0798527

Exercise 2

Compute the Gauss curvature for X(u,v) =
  {-2 v + v Cos[u] + 2 v Sin[u], -2 v + 2 v Cos[u] + 5 v Sin[u], v} at the point (u,v) = (2,9).

1) K(2,9) = -4.48966

2) K(2,9) = 0

3) K(2,9) = -8.30327

4) K(2,9) = 3.79294

5) K(2,9) = -0.932149

Exercise 3

Compute the mean curvature for X(u,v) = {3 u, u^3, v} at the point (u,v) = (1,5).

1) H(1,5) = 1.43039

2) H(1,5) = 6.14017

3) H(1,5) = 2.28055

4) H(1,5) = -5.01174

5) H(1,5) = 0.117851

Further Mathematics - 2023/2024
Chapter 3 - Test for serial number: 6

Exercise 1

Compute the torsion for $C(t) = \{t - 2(8 + 9t - 7t^2) + 2(1 + 9t + 6t^2),$
$-3(8 + 9t - 7t^2) - 2(1 + 9t + 6t^2), 1 + 9t + 6t^2 + 2(8 + 9t - 7t^2)\}$ at the point t=0.

1) $\tau(0) = 0$

2) $\tau(0) = -3.91447$

3) $\tau(0) = -1.42149$

4) $\tau(0) = -2.79446$

5) $\tau(0) = -6.70766$

Exercise 2

Compute the Gauss curvature for $X(u,v) =$
$\{(1 + 2v^2) \text{Cos}[u], 2v + (1 + 2v^2) \text{Sin}[u], v + (1 + 2v^2) \text{Cos}[u]\}$ at the point $(u,v) = (6,6)$.

1) $K(6,6) = -4.17958 \times 10^{-8}$

2) $K(6,6) = -1.07519$

3) $K(6,6) = -5.98775$

4) $K(6,6) = 7.70517$

5) $K(6,6) = -5.87918$

Exercise 3

Compute the Gauss curvature for $X(u,v) = \{\text{Cos}[u], \text{Sin}[u], v\}$ at the point $(u,v) = (2,8)$.

1) $K(2,8) = -0.869127$

2) $K(2,8) = 3.54149$

3) $K(2,8) = 0$

4) $K(2,8) = 1.24914$

5) $K(2,8) = 4.85577$

Further Mathematics - 2023/2024
Chapter 3 - Test for serial number: 7

Exercise 1

Compute the curvature for `C(t) = {2 Sin[t], -Cos[t] + 4 Sin[t], -Cos[t]}` at the point t=4.

1) `k(4) = -7.99907`

2) `k(4) = -4.61591`

3) `k(4) = 7.15999`

4) `k(4) = 3.18295`

5) `k(4) = 0.097164`

Exercise 2

Compute the Gauss curvature for `X(u,v) =`
`{Cos[u], -2 v - 3 Cos[u] + Sin[u], v + Cos[u]}` at the point `(u,v) = (0,6)`.

1) `K(0,6) = 7.7688`

2) `K(0,6) = 0`

3) `K(0,6) = 3.64689`

4) `K(0,6) = 7.4088`

5) `K(0,6) = -7.93524`

Exercise 3

Compute the mean curvature for $X(u,v) = \left\{2\,u,\ 2\,u^3,\ v\right\}$ at the point `(u,v) = (6,10)`.

1) `H(6,10) = -6.55795`

2) $H(6,10) = 7.14357 \times 10^{-6}$

3) `H(6,10) = -2.9766`

4) `H(6,10) = -2.78816`

5) `H(6,10) = -8.22358`

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Further Mathematics - 2023/2024
Chapter 3 - Test for serial number: 8

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Exercise 1

Compute the torsion for $C(t) = \{Cos[t], 2t + Sin[t], 2t + 2 Cos[t]\}$ at the point t=1.

1) $\tau(1) = -4.09512$

2) $\tau(1) = -7.1352$

3) $\tau(1) = 0.171844$

4) $\tau(1) = 6.07669$

5) $\tau(1) = 4.68319$

Exercise 2

Compute the mean curvature for $X(u,v) =$
  $\{3 v Cos[u] + 2 v Sin[u], -2 v + 13 v Cos[u] + 9 v Sin[u], v - 6 v Cos[u] - 4 v Sin[u]\}$
   at the point $(u,v) = (1,10)$.

1) $H(1,10) = -6.0604$

2) $H(1,10) = 8.00377$

3) $H(1,10) = 0.277694$

4) $H(1,10) = -3.06105$

5) $H(1,10) = 8.52269$

Exercise 3

Compute the Gauss curvature for $X(u,v) = \{3u, 3u^2, v\}$ at the point $(u,v) = (1,8)$.

1) $K(1,8) = 4.8754$

2) $K(1,8) = -7.20525$

3) $K(1,8) = 0$

4) $K(1,8) = -8.23772$

5) $K(1,8) = 4.39643$

Further Mathematics - 2023/2024
Chapter 3 - Test for serial number: 9

Exercise 1

Compute the curvature for `C(t)={5 Cos[t], 15 Cos[t] + 5 Sin[t], -10 Cos[t]}` at the point t=2.

1) k(2) = 4.23729

2) k(2) = 3.82094

3) k(2) = 0.00851991

4) k(2) = 4.53521

5) k(2) = 3.28997

Exercise 2

Compute the Gauss curvature for `X(u,v) =`
`{Cos[u] (4 + Cos[v]) + 2 Sin[v], -Cos[u] (4 + Cos[v]) + (4 + Cos[v]) Sin[u] - 2 Sin[v],`
`(4 + Cos[v]) Sin[u] + Sin[v]}` at the point `(u,v)=(5,5)`.

1) K(5,5) = 6.68546

2) K(5,5) = 2.06464

3) K(5,5) = 0.00824109

4) K(5,5) = -5.43542

5) K(5,5) = -8.31514

Exercise 3

Compute the mean curvature for `X(u,v)={Cos[u], Sin[u], v}` at the point `(u,v)=(2,4)`.

1) H(2,4) = 0.5

2) H(2,4) = 7.65081

3) H(2,4) = -2.67039

4) H(2,4) = 5.4372

5) H(2,4) = -4.4592

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Further Mathematics - 2023/2024
Chapter 3 - Test for serial number: 10

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Exercise 1

Compute the curvature for `C(t) = {4 Cos[t], 2 Sin[t], 4 Sin[t]}` at the point t=0.

1) k(0) = 6.18634

2) k(0) = -0.848278

3) k(0) = 0.2

4) k(0) = -2.62532

5) k(0) = -1.51759

Exercise 2

Compute the Gauss curvature for X(u,v) =
  {-Cos[u] (3 + 2 Cos[v]) - 10 (3 + 2 Cos[v]) Sin[u] + 4 Sin[v],
   Cos[u] (3 + 2 Cos[v]) + 5 (3 + 2 Cos[v]) Sin[u] - 2 Sin[v],
   -Cos[u] (3 + 2 Cos[v]) - 2 (3 + 2 Cos[v]) Sin[u] + Sin[v]} at the point (u,v) = (6,0).

1) K(6,0) = -6.22067

2) K(6,0) = 3.03755

3) K(6,0) = 3.73557

4) K(6,0) = 0.105557

5) K(6,0) = 7.93197

Exercise 3

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

1) K(2,5) = -6.89224

2) K(2,5) = -8.41697

3) K(2,5) = 0

4) K(2,5) = 4.45377

5) K(2,5) = 7.59238

Further Mathematics - 2023/2024
Chapter 3 - Test for serial number: 11

Exercise 1

Compute the curvature for C(t) =
  {-t + 5 Cos[t] + 10 Sin[t], Sin[t], t - 4 Cos[t] - 8 Sin[t]} at the point t=1.

1) k(1) = 1.66972

2) k(1) = 41.3097

3) k(1) = 0.611416

4) k(1) = 7.96614

5) k(1) = 8.63903

Exercise 2

Compute the mean curvature for X(u,v) =
  $\{12 u^2 + u (-15 + 8 v) - 2 (8 + 7 v + 9 v^2), -v, 8 - 6 u^2 - 4 u (-2 + v) + 7 v + 9 v^2\}$
  at the point (u,v) = (9,5).

1) H(9,5) = 4.12595

2) H(9,5) = -4.91014

3) H(9,5) = -1.06397

4) H(9,5) = 0.0187211

5) H(9,5) = 4.61109

Exercise 3

Compute the Gauss curvature for X(u,v) = {Cos[u], Sin[u], v} at the point (u,v) = (1,2).

1) K(1,2) = 0

2) K(1,2) = -8.87491

3) K(1,2) = -1.77533

4) K(1,2) = 3.00973

5) K(1,2) = -8.60992

Further Mathematics - 2023/2024
Chapter 3 - Test for serial number: 12

Exercise 1

Compute the torsion for C(t) =
$\left\{-4\,t - 11\,t^2,\ -4 - 2\,t + 3\,t^2,\ -4 - 5\,t - 8\,t^2 - 2\left(-4 - 2\,t + 3\,t^2\right)\right\}$ at the point t=2.

1) τ(2) = 7.53844

2) τ(2) = 0

3) τ(2) = -8.97798

4) τ(2) = 4.69351

5) τ(2) = 0.761108

Exercise 2

Compute the mean curvature for X(u,v) =
$\{-v,\ 2\,v + 4\,\text{Cos}[u] - \text{Sin}[u],\ v + 3\,\text{Cos}[u] - \text{Sin}[u]\}$ at the point (u,v) = (5,7).

1) H(5,7) = -2.04523

2) H(5,7) = -3.02695

3) H(5,7) = 4.18078

4) H(5,7) = -6.99177

5) H(5,7) = 0.0290496

Exercise 3

Compute the mean curvature for X(u,v) = {Cos[u], Sin[u], v} at the point (u,v) = (4,10).

1) H(4,10) = -7.4615

2) H(4,10) = -4.62031

3) H(4,10) = 4.20174

4) H(4,10) = 3.69526

5) H(4,10) = 0.5

Further Mathematics - 2023/2024
Chapter 3 - Test for serial number: 13

Exercise 1

Compute the torsion for `C(t)={3 t + Cos[t] - Sin[t], -2 t + Sin[t], t}` at the point t=6.

1) $\tau(6)$ = 0.493722

2) $\tau(6)$ = 2.48833

3) $\tau(6)$ = 5.74247

4) $\tau(6)$ = 6.9807

5) $\tau(6)$ = 3.08088

Exercise 2

Compute the Gauss curvature for `X(u,v) =`
 `{-2 v + 5 v Cos[u], v Sin[u], 9 v - 22 v Cos[u] + 2 v Sin[u]}` at the point (u,v)=(0,6).

1) K(0,6) = 0

2) K(0,6) = 7.59386

3) K(0,6) = 2.3002

4) K(0,6) = 3.83988

5) K(0,6) = -6.5657

Exercise 3

Compute the Gauss curvature for `X(u,v)={Cos[u], Sin[u], v}` at the point (u,v)=(2,10).

1) K(2,10) = 2.04504

2) K(2,10) = 3.12168

3) K(2,10) = 7.28766

4) K(2,10) = -7.23515

5) K(2,10) = 0

Further Mathematics - 2023/2024
Chapter 3 - Test for serial number: 14

Exercise 1

Compute the torsion for $C(t) = \left\{ 6 + 5\,t - 4\,t^2,\ -6 - 4\,t + 4\,t^2,\ 6 + 15\,t + 3\,t^2 \right\}$ at the point t=8.

1) $\tau(8) = 2.42436$

2) $\tau(8) = 0$

3) $\tau(8) = 5.51307$

4) $\tau(8) = 2.74906$

5) $\tau(8) = 4.95534$

Exercise 2

Compute the Gauss curvature for $X(u,v) =$
$\left\{ 6 - 8\,u^2 - 18\,v - 4\,v^2 - u\,(9 + 14\,v),\ 2\,u + v,\ 3 - 4\,u^2 - 8\,v - 2\,v^2 - u\,(3 + 7\,v) \right\}$
at the point $(u,v) = (6,-3)$.

1) $K(6,-3) = -4.65105$

2) $K(6,-3) = -3.19271$

3) $K(6,-3) = 5.00056$

4) $K(6,-3) = -1.76288$

5) $K(6,-3) = -9.08266 \times 10^{-8}$

Exercise 3

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

1) $K(1,1) = 0$

2) $K(1,1) = 1.54474$

3) $K(1,1) = -4.50198$

4) $K(1,1) = -0.869429$

5) $K(1,1) = -7.67852$

| Further Mathematics - 2023/2024
| Chapter 3 - Test for serial number: 15

Exercise 1

Compute the curvature for C(t) =
{4 Cos[t] + Sin[t], -Cos[t], 2 t + 4 Cos[t] + Sin[t]} at the point t=0.

1) k(0) = -4.42255

2) k(0) = 0.272029

3) k(0) = -1.97526

4) k(0) = 5.41151

5) k(0) = 8.02538

Exercise 2

Compute the Gauss curvature for X(u,v) =
$\left\{ -3 u - 2 v, 2 u + v, 7 + 7 u^2 - 5 v + 4 v^2 + u (-5 + 6 v) \right\}$ at the point (u,v) = (-3,4).

1) K(-3,4) = -6.27548

2) K(-3,4) = 2.8238

3) K(-3,4) = 1.54616×10^{-6}

4) K(-3,4) = -4.923

5) K(-3,4) = -2.75383

Exercise 3

Compute the Gauss curvature for X(u,v) = {Cos[u], Sin[u], v} at the point (u,v) = (1,8).

1) K(1,8) = 0

2) K(1,8) = 3.65712

3) K(1,8) = -4.28182

4) K(1,8) = 8.67568

5) K(1,8) = 8.69806

Further Mathematics - 2023/2024
Chapter 3 - Test for serial number: 16

Exercise 1

Compute the curvature for $C(t) = \{2 - 8t + 8t^2, 8 + 7t + 6t^2, -2 + 9t - 8t^2\}$ at the point t=9.

1) k(9) = 0.0000271615

2) k(9) = 3.5733

3) k(9) = 2.90113

4) k(9) = -3.69835

5) k(9) = -5.76175

Exercise 2

Compute the mean curvature for $X(u,v) =$
$\{Cos[u] (3 + 2 Cos[v]) + 3 (3 + 2 Cos[v]) Sin[u] + 2 Sin[v], (3 + 2 Cos[v]) Sin[u],$
$Cos[u] (3 + 2 Cos[v]) + 3 (3 + 2 Cos[v]) Sin[u] + 3 Sin[v]\}$ at the point $(u,v) = (6,5)$.

1) H(6,5) = -0.8396

2) H(6,5) = -7.1912

3) H(6,5) = -8.22872

4) H(6,5) = 0.385968

5) H(6,5) = 2.73391

Exercise 3

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

1) K(8,6) = -8.06553

2) K(8,6) = 0

3) K(8,6) = -2.92089

4) K(8,6) = 3.92022

5) K(8,6) = 5.16465

Exercise 1

Compute the torsion for $C(t) = \{-6 + 7 t, -3 + 3 t, 6 + 5 t + 8 t^2\}$ at the point t=6.

1) $\tau(6) = -8.88759$

2) $\tau(6) = -4.11604$

3) $\tau(6) = 0$

4) $\tau(6) = 1.02049$

5) $\tau(6) = 7.21506$

Exercise 2

Compute the Gauss curvature for $X(u,v) =$
$\{v \cos[u], -2 v - 2 v \cos[u] + 5 v \sin[u], v - 2 v \sin[u]\}$ at the point (u,v) = (2,8).

1) $K(2,8) = -1.04269$

2) $K(2,8) = 0$

3) $K(2,8) = -8.37691$

4) $K(2,8) = -1.63775$

5) $K(2,8) = 5.62946$

Exercise 3

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) $K(3,9) = -5.57622$

3) $K(3,9) = -1.04208$

4) $K(3,9) = -4.54446$

5) $K(3,9) = 5.1801$

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Further Mathematics - 2023/2024
Chapter 3 - Test for serial number: 18

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Exercise 1

Compute the torsion for $C(t) =$
$\left\{t - 2\left(9 + 8t + t^2\right) - 2\left(8 - 4t + 5t^2\right),\ 9 + 8t + t^2,\ -8 + 5t - 5t^2\right\}$ at the point t=7.

1) $\tau(7) = 0$

2) $\tau(7) = 8.93266$

3) $\tau(7) = -1.39116$

4) $\tau(7) = 4.88037$

5) $\tau(7) = -1.44732$

Exercise 2

Compute the mean curvature for $X(u,v) =$
$\left\{\text{Cos}[u],\ -\text{Cos}[u] + \text{Sin}[u],\ v + \text{Sin}[u]\right\}$ at the point $(u,v) = (4,-8)$.

1) $H(4,-8) = 5.35893$

2) $H(4,-8) = 4.6476$

3) $H(4,-8) = 0.12192$

4) $H(4,-8) = 2.12397$

5) $H(4,-8) = -5.89111$

Exercise 3

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

1) $H(4,4) = -1.25084$

2) $H(4,4) = 4.84739$

3) $H(4,4) = 0.000323623$

4) $H(4,4) = -4.54752$

5) $H(4,4) = 7.62482$

Further Mathematics - 2023/2024
Chapter 3 - Test for serial number: 19

Exercise 1

Compute the curvature for $C(t) =$
$\left\{-1 - t + 16\,t^2,\ t - 3\left(7 - 2\,t - 7\,t^2\right),\ 7 - 2\,t - 7\,t^2\right\}$ at the point t=10.

1) $k(10) = 1.65384 \times 10^{-6}$

2) $k(10) = 2.86422$

3) $k(10) = -7.21677$

4) $k(10) = -1.52588$

5) $k(10) = -8.97859$

Exercise 2

Compute the Gauss curvature for $X(u,v) =$
$\{2\,v + v\,Cos[u],\ -11\,v - 5\,v\,Cos[u] + v\,Sin[u],\ 3\,v + v\,Cos[u]\}$ at the point $(u,v) = (1,9)$.

1) $K(1,9) = -5.48316$

2) $K(1,9) = -2.02624$

3) $K(1,9) = 6.3592$

4) $K(1,9) = 0$

5) $K(1,9) = -8.79853$

Exercise 3

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

1) $K(2,6) = 5.91638$

2) $K(2,6) = 3.00607$

3) $K(2,6) = 0$

4) $K(2,6) = -7.63361$

5) $K(2,6) = -5.73765$

Further Mathematics - 2023/2024
Chapter 3 - Test for serial number: 20

Exercise 1

Compute the curvature for $C(t) = \{6\cos[t], 5\sin[t], 2\cos[t]\}$ at the point $t=5$.

1) $k(5) = 0.130879$

2) $k(5) = -2.20145$

3) $k(5) = -3.52335$

4) $k(5) = -3.35669$

5) $k(5) = -8.08865$

Exercise 2

Compute the Gauss curvature for $X(u,v) =$
$\left\{ u, -18 - 18u^2 - 13v + 4u(4 + 3v), 9 + 9u^2 + 7v - 6u(1 + v) \right\}$ at the point $(u,v) = (3,0)$.

1) $K(3,0) = 8.96889$

2) $K(3,0) = -1.19409$

3) $K(3,0) = -3.72647$

4) $K(3,0) = -4.33396 \times 10^{-7}$

5) $K(3,0) = -7.94294$

Exercise 3

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

1) $H(5,2) = 2.14427$

2) $H(5,2) = 1.79764$

3) $H(5,2) = 2.56804$

4) $H(5,2) = 1.80888$

5) $H(5,2) = 0.5$

Further Mathematics - 2023/2024
Chapter 3 - Test for serial number: 21

Exercise 1

Compute the curvature for C(t) =
{-4 t + Cos[t] + 2 Sin[t], Sin[t], 10 t - 2 Cos[t] - 4 Sin[t]} at the point t=5.

1) k(5) = -2.21734

2) k(5) = 0.0217326

3) k(5) = -4.00162

4) k(5) = 2.50908

5) k(5) = -4.13749

Exercise 2

Compute the mean curvature for X(u,v) =
{Cos[u], Sin[u], v - 2 Cos[u]} at the point (u,v) = (4,-5).

1) H(4,-5) = 0.5

2) H(4,-5) = 2.98722

3) H(4,-5) = -1.14512

4) H(4,-5) = 2.67675

5) H(4,-5) = 6.32239

Exercise 3

Compute the mean curvature for X(u,v) = {3 u, u², v} at the point (u,v) = (2,9).

1) H(2,9) = 1.51355

2) H(2,9) = 0.823908

3) H(2,9) = -3.22833

4) H(2,9) = -8.73146

5) H(2,9) = 0.024

Exercise 1

Compute the torsion for $C(t) = \{Cos[t] + 3\,Sin[t],\ Sin[t],\ 3\,t\}$ at the point t=1.

1) $\tau(1) = 8.57133$

2) $\tau(1) = 0.763662$

3) $\tau(1) = 0.0326424$

4) $\tau(1) = -3.15588$

5) $\tau(1) = -2.03769$

Exercise 2

Compute the Gauss curvature for $X(u,v) =$
$\{3\,Cos[u] - Sin[u],\ -2\,Cos[u] + Sin[u],\ v + 5\,Cos[u] - 2\,Sin[u]\}$ at the point $(u,v) = (4,2)$.

1) $K(4,2) = 0.80134$

2) $K(4,2) = -3.12986$

3) $K(4,2) = -8.37666$

4) $K(4,2) = 0$

5) $K(4,2) = -4.5405$

Exercise 3

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

1) $H(6,2) = -5.45529$

2) $H(6,2) = 4.57571$

3) $H(6,2) = 0.0000285633$

4) $H(6,2) = -3.93668$

5) $H(6,2) = 3.88687$

Further Mathematics - 2023/2024
Chapter 3 - Test for serial number: 23

Exercise 1

Compute the curvature for $C(t) = \{6\,Cos[t] + 10\,Sin[t], 14\,Cos[t] + 25\,Sin[t], 0\}$ at the point t=0.

1) k(0) = 3.1625

2) k(0) = -3.09485

3) k(0) = 6.35848

4) k(0) = -4.02829

5) k(0) = 0.000512263

Exercise 2

Compute the mean curvature for $X(u,v) =$
$\{u, -18 - 9\,u - 6\,u^2 - 20\,v + 21\,u\,v + 12\,v^2, -6 - 2\,u^2 - 7\,v + 4\,v^2 + u\,(-3 + 7\,v)\}$
at the point (u,v)=(7,6).

1) H(7,6) = 5.85968

2) H(7,6) = -5.1238

3) H(7,6) = 0.00976033

4) H(7,6) = -1.19082

5) H(7,6) = -5.79247

Exercise 3

Compute the Gauss curvature for $X(u,v) = \{Cos[u], Sin[u], v\}$ at the point (u,v)=(2,10).

1) K(2,10) = 5.57153

2) K(2,10) = 6.33558

3) K(2,10) = -1.76453

4) K(2,10) = 8.41998

5) K(2,10) = 0

Further Mathematics - 2023/2024
Chapter 3 - Test for serial number: 24

Exercise 1

Compute the curvature for C(t) =
{3 Cos[t] - Sin[t], Sin[t], -6 Cos[t] + 2 Sin[t]} at the point t=3.

1) k(3) = 1.61363

2) k(3) = 0.664147

3) k(3) = 7.97343

4) k(3) = -3.20878

5) k(3) = 6.57287

Exercise 2

Compute the mean curvature for X(u,v) =
{Cos[u] + Sin[u], -v + 2 Cos[u] + 5 Sin[u], v - Cos[u] - 3 Sin[u]} at the point (u,v) = (2,-4).

1) H(2,-4) = -3.64033

2) H(2,-4) = 7.44746

3) H(2,-4) = 1.89379

4) H(2,-4) = 2.29533

5) H(2,-4) = 0.0596983

Exercise 3

Compute the mean curvature for X(u,v) = {Cos[u], Sin[u], v} at the point (u,v) = (1,8).

1) H(1,8) = 1.1168

2) H(1,8) = 0.5

3) H(1,8) = -8.86088

4) H(1,8) = -3.15147

5) H(1,8) = 2.31042

Further Mathematics - 2023/2024
Chapter 3 - Test for serial number: 25

Exercise 1

Compute the curvature for $C(t) = \{-3t, -3t + \text{Cos}[t] + \text{Sin}[t], 6t + \text{Cos}[t]\}$ at the point t=5.

1) k(5) = -2.1073

2) k(5) = 0.0100701

3) k(5) = -6.35885

4) k(5) = 4.773

5) k(5) = 7.55127

Exercise 2

Compute the Gauss curvature for $X(u,v) = \{-v + v\,\text{Cos}[u] + v\,\text{Sin}[u], v + v\,\text{Sin}[u], v\}$ at the point (u,v)=(1,-1).

1) K(1,-1) = -5.78335

2) K(1,-1) = -5.45041

3) K(1,-1) = 7.77129

4) K(1,-1) = 0

5) K(1,-1) = -6.36339

Exercise 3

Compute the Gauss curvature for $X(u,v) = \{3u, 2u^3, v\}$ at the point (u,v)=(4,1).

1) K(4,1) = 0

2) K(4,1) = 2.50746

3) K(4,1) = -8.18912

4) K(4,1) = -8.14753

5) K(4,1) = 2.38101

Further Mathematics - 2023/2024
Chapter 3 - Test for serial number: 26

Exercise 1

Compute the curvature for $C(t) = \{Cos[t], Sin[t], t + Cos[t] - Sin[t]\}$ at the point t=4.

1) $k(4) = 0.146952$

2) $k(4) = -8.36468$

3) $k(4) = 1.69223$

4) $k(4) = 6.15943$

5) $k(4) = 0.740191$

Exercise 2

Compute the Gauss curvature for $X(u,v) =$
$\{-8 - 8u^2 + u(3 - 8v) - 19v + 2v^2, v, 4 + 4u^2 + 7v - v^2 + u(-1 + 4v)\}$ at the point $(u,v) = (6,2)$.

1) $K(6,2) = 2.92534$

2) $K(6,2) = -2.84209 \times 10^{-9}$

3) $K(6,2) = -8.79558$

4) $K(6,2) = -2.91609$

5) $K(6,2) = -2.94947$

Exercise 3

Compute the mean curvature for $X(u,v) = \{3u, 3u^2, v\}$ at the point $(u,v) = (7,6)$.

1) $H(7,6) = -1.19084$

2) $H(7,6) = 0.000120553$

3) $H(7,6) = -0.819873$

4) $H(7,6) = 6.06188$

5) $H(7,6) = 5.2853$

Further Mathematics - 2023/2024
Chapter 3 - Test for serial number: 27

Exercise 1

Compute the torsion for $C(t) = \{t, 2t + 3(5 - 9t + 3t^2) + 2(-2 + 2t + 7t^2),$
$3t + 4(5 - 9t + 3t^2) + 3(-2 + 2t + 7t^2)\}$ at the point t=9.

1) $\tau(9) = -7.47967$

2) $\tau(9) = -5.59337$

3) $\tau(9) = -3.94529$

4) $\tau(9) = -5.96686$

5) $\tau(9) = 0$

Exercise 2

Compute the Gauss curvature for $X(u,v) =$
$\{2v + v\,Cos[u] - 6v\,Sin[u], v\,Sin[u], v - 2v\,Sin[u]\}$ at the point $(u,v) = (2,7)$.

1) $K(2,7) = -4.33225$

2) $K(2,7) = -8.08438$

3) $K(2,7) = 0$

4) $K(2,7) = -5.91374$

5) $K(2,7) = 6.23554$

Exercise 3

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

1) $K(2,7) = 6.09646$

2) $K(2,7) = 0$

3) $K(2,7) = -3.38594$

4) $K(2,7) = -3.17702$

5) $K(2,7) = 1.59195$

Further Mathematics - 2023/2024
Chapter 3 - Test for serial number: 28

Exercise 1

Compute the curvature for `C(t)={4 Cos[t] - 4 Sin[t], 4 Cos[t] - 2 Sin[t], 0}` at the point t=1.

1) `k(1) = -2.38242`

2) `k(1) = -0.491414`

3) `k(1) = 0.0224119`

4) `k(1) = 1.16776`

5) `k(1) = -5.23989`

Exercise 2

Compute the Gauss curvature for `X(u,v) =`
`{2 v + Cos[u] - 2 Sin[u], -v + Sin[u], 7 v + 2 Cos[u] - 6 Sin[u]}` at the point `(u,v)=(1,3)`.

1) `K(1,3) = -5.16585`

2) `K(1,3) = 0`

3) `K(1,3) = -3.96767`

4) `K(1,3) = 6.17105`

5) `K(1,3) = -3.30648`

Exercise 3

Compute the Gauss curvature for `X(u,v)={Cos[u], Sin[u], v}` at the point `(u,v)=(0,3)`.

1) `K(0,3) = 2.96579`

2) `K(0,3) = 4.53937`

3) `K(0,3) = -6.19925`

4) `K(0,3) = 0`

5) `K(0,3) = -5.09613`

Further Mathematics - 2023/2024
Chapter 3 - Test for serial number: 29

Exercise 1

Compute the curvature for C(t) =
{3 Cos[t] + 10 Sin[t], Cos[t] + 5 Sin[t], 4 Cos[t] + 10 Sin[t]} at the point t=2.

1) k(2) = 8.13359

2) k(2) = -1.8831

3) k(2) = 1.93141

4) k(2) = 2.28389

5) k(2) = 0.0118188

Exercise 2

Compute the Gauss curvature for X(u,v) =
$\{-4 - 6v - 7v^2 + u(-7 + 4v), 16 - 16u(-2 + v) + 25v + 28v^2, -4 + 4u(-2 + v) - 6v - 7v^2\}$
at the point (u,v) = (4,6).

1) K(4,6) = -4.51835

2) K(4,6) = -1.68979

3) K(4,6) = -1.51553

4) K(4,6) = -1.48783×10^{-9}

5) K(4,6) = 8.04959

Exercise 3

Compute the mean curvature for X(u,v) = {Cos[u], Sin[u], v} at the point (u,v) = (1,9).

1) H(1,9) = -7.88022

2) H(1,9) = 7.93978

3) H(1,9) = -3.28899

4) H(1,9) = 4.11536

5) H(1,9) = 0.5

Further Mathematics - 2023/2024
Chapter 3 - Test for serial number: 30

Exercise 1

Compute the curvature for $C(t) = \{t, 3t + 5t^2, 1 - 7t + 5t^2\}$ at the point t=8.

1) k(8) = -1.6194

2) k(8) = 1.52701

3) k(8) = 0.0000747733

4) k(8) = 8.80765

5) k(8) = 2.39353

Exercise 2

Compute the mean curvature for X(u,v) =
  {Cos[u] (2 + Cos[v]) + (2 + Cos[v]) Sin[u] - Sin[v], (2 + Cos[v]) Sin[u] - Sin[v], Sin[v]}
   at the point (u,v) = (2,6).

1) H(2,6) = 3.50387

2) H(2,6) = 7.18253

3) H(2,6) = 4.03914

4) H(2,6) = -0.253375

5) H(2,6) = 0.419302

Exercise 3

Compute the Gauss curvature for X(u,v) = {Cos[u], Sin[u], v} at the point (u,v) = (6,9).

1) K(6,9) = 0

2) K(6,9) = 2.11705

3) K(6,9) = -6.09421

4) K(6,9) = -0.800789

5) K(6,9) = 4.35923

Further Mathematics - 2023/2024
Chapter 3 - Test for serial number: 31

Exercise 1

Compute the curvature for C(t) =
{5 Cos[t] + 18 Sin[t], 3 Sin[t], -2 Cos[t] - 3 Sin[t]} at the point t=1.

1) k(1) = 5.51889

2) k(1) = 7.06833

3) k(1) = 0.139255

4) k(1) = -6.69489

5) k(1) = 8.12458

Exercise 2

Compute the mean curvature for X(u,v) = {Cos[u] (3 + 2 Cos[v]) - (3 + 2 Cos[v]) Sin[u] - 2 Sin[v],
  -Cos[u] (3 + 2 Cos[v]) + 2 (3 + 2 Cos[v]) Sin[u] + 4 Sin[v],
  Cos[u] (3 + 2 Cos[v]) - (3 + 2 Cos[v]) Sin[u] - Sin[v]} at the point (u,v) = (2,0).

1) H(2,0) = -0.783977

2) H(2,0) = 0.135768

3) H(2,0) = -3.36797

4) H(2,0) = 3.9273

5) H(2,0) = -5.17727

Exercise 3

Compute the mean curvature for X(u,v) = {u, u^3, v} at the point (u,v) = (6,7).

1) H(6,7) = 1.7811

2) H(6,7) = 0.0000142871

3) H(6,7) = -3.89076

4) H(6,7) = -1.96995

5) H(6,7) = -2.05263

Further Mathematics - 2023/2024
Chapter 3 - Test for serial number: 32

Exercise 1

Compute the curvature for $C(t) = \{-t + \text{Cos}[t], -t + \text{Sin}[t], t\}$ at the point t=0.

1) $k(0) = -5.77604$

2) $k(0) = 8.22412$

3) $k(0) = 0.353553$

4) $k(0) = 1.5775$

5) $k(0) = -4.91547$

Exercise 2

Compute the mean curvature for $X(u,v) =$
$\left\{-9 + 5u^2 + 4v^2 - u(4 + 3v), v, 9 - 5u^2 + 3v - 4v^2 + u(5 + 3v)\right\}$ at the point $(u,v) = (-6,6)$.

1) $H(-6,6) = 0.0017359$

2) $H(-6,6) = 1.82207$

3) $H(-6,6) = 4.65493$

4) $H(-6,6) = 6.68193$

5) $H(-6,6) = -5.51739$

Exercise 3

Compute the Gauss curvature for $X(u,v) = \{\text{Cos}[u], \text{Sin}[u], v\}$ at the point $(u,v) = (0,9)$.

1) $K(0,9) = -3.431$

2) $K(0,9) = -0.841086$

3) $K(0,9) = -4.82838$

4) $K(0,9) = 6.48616$

5) $K(0,9) = 0$

Further Mathematics - 2023/2024
Chapter 3 - Test for serial number: 33

Exercise 1

Compute the torsion for C(t) =
{Cos[t] - 2 Sin[t], 4 t + 2 Cos[t] + Sin[t], 2 t + 2 Sin[t]} at the point t=6.

1) τ(6) = 0.00838097

2) τ(6) = -6.23306

3) τ(6) = 5.44552

4) τ(6) = 6.75205

5) τ(6) = 3.09509

Exercise 2

Compute the Gauss curvature for X(u,v) =
$\{2 v + (1 + 3 v^2) \text{Cos}[u] + 2 (1 + 3 v^2) \text{Sin}[u], 2 v - (1 + 3 v^2) \text{Cos}[u] + 3 (1 + 3 v^2) \text{Sin}[u],$
$-v + (1 + 3 v^2) \text{Cos}[u] - 2 (1 + 3 v^2) \text{Sin}[u]\}$ at the point (u,v) = (0,-5).

1) K(0,-5) = 6.85857

2) K(0,-5) = 7.27519

3) K(0,-5) = -7.59291

4) K(0,-5) = 0

5) K(0,-5) = -8.56004

Exercise 3

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

1) K(4,4) = -1.17705

2) K(4,4) = 0

3) K(4,4) = -3.57863

4) K(4,4) = -8.66097

5) K(4,4) = -1.8895

Further Mathematics - 2023/2024
Chapter 3 - Test for serial number: 34

Exercise 1

Compute the curvature for $C(t) =$
$\left\{ 3 - 2t - 5t^2 + 2\left(-4t + 8t^2\right), t + 3\left(-4t + 8t^2\right), 3 - 3t - 5t^2 \right\}$ at the point t=5.

1) k(5) = 8.51359

2) k(5) = 5.16974

3) k(5) = 0.0000231371

4) k(5) = 2.7085

5) k(5) = 7.57083

Exercise 2

Compute the mean curvature for $X(u,v) =$
$\{\text{Cos}[u] (3 + \text{Cos}[v]) - \text{Sin}[v], (3 + \text{Cos}[v]) \text{Sin}[u], -\text{Cos}[u] (3 + \text{Cos}[v]) + 2\text{Sin}[v]\}$
at the point (u,v) = (5,1).

1) H(5,1) = -3.32586

2) H(5,1) = 0.287508

3) H(5,1) = -6.46492

4) H(5,1) = -0.335184

5) H(5,1) = 4.9628

Exercise 3

Compute the mean curvature for $X(u,v) = \left\{ 3u, u^3, v \right\}$ at the point (u,v) = (2,4).

1) H(2,4) = 0.0095112

2) H(2,4) = 7.38617

3) H(2,4) = -6.63613

4) H(2,4) = 6.5537

5) H(2,4) = 4.3133

Further Mathematics - 2023/2024
Chapter 3 - Test for serial number: 35

Exercise 1

Compute the curvature for $C(t) =$
$\{4\cos[t] + 3\sin[t], -8\cos[t] - 3\sin[t], 4\cos[t] + 3\sin[t]\}$ at the point t=0.

1) k(0) = 6.49685

2) k(0) = 0.120962

3) k(0) = -5.04656

4) k(0) = -2.51938

5) k(0) = -6.38557

Exercise 2

Compute the Gauss curvature for $X(u,v) =$
$\{-2v + (1 + 2v^2)\cos[u], -2v + (1 + 2v^2)\cos[u] + (1 + 2v^2)\sin[u],$
$3v - (1 + 2v^2)\cos[u] + (1 + 2v^2)\sin[u]\}$ at the point $(u,v) = (5,-9)$.

1) K(5,-9) = -8.63091

2) K(5,-9) = -7.99093

3) K(5,-9) = 4.23102

4) K(5,-9) = 7.42023

5) K(5,-9) = -3.58169×10^{-10}

Exercise 3

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

1) K(3,7) = 7.9

2) K(3,7) = 2.49835

3) K(3,7) = 0

4) K(3,7) = -3.25891

5) K(3,7) = -6.37937

Further Mathematics - 2023/2024
Chapter 3 - Test for serial number: 36

Exercise 1

Compute the curvature for $C(t) = \{3\cos[t] + 5\sin[t], 3\cos[t] + 10\sin[t], 0\}$ at the point t=0.

1) $k(0) = 0.0107331$

2) $k(0) = -3.17968$

3) $k(0) = -2.31003$

4) $k(0) = 1.68115$

5) $k(0) = -4.83651$

Exercise 2

Compute the mean curvature for $X(u,v) =$
$\{6 + 10\,u^2 - 16\,v + 8\,v^2 + u\,(-17 + 8\,v), 18 + 30\,u^2 - 47\,v + 24\,v^2 + 4\,u\,(-13 + 6\,v),$
$-3 - 5\,u^2 - 4\,u\,(-2 + v) + 8\,v - 4\,v^2\}$ at the point $(u,v) = (-5,-9)$.

1) $H(-5,-9) = 6.25413$

2) $H(-5,-9) = -1.0181$

3) $H(-5,-9) = -0.00760613$

4) $H(-5,-9) = 2.23087$

5) $H(-5,-9) = 6.06281$

Exercise 3

Compute the mean curvature for $X(u,v) = \{3\,u, u^2, v\}$ at the point $(u,v) = (6,4)$.

1) $H(6,4) = 0.0015852$

2) $H(6,4) = -1.79603$

3) $H(6,4) = 1.45928$

4) $H(6,4) = 2.49726$

5) $H(6,4) = 0.686982$

Further Mathematics - 2023/2024
Chapter 3 - Test for serial number: 37

Exercise 1

Compute the curvature for `C(t) =`
`{4 t + Cos[t] - 2 Sin[t], 2 Cos[t] + Sin[t], 2 t - 4 Cos[t] - 3 Sin[t]}` at the point t=5.

1) `k(5) = -5.98492`

2) `k(5) = -1.54634`

3) `k(5) = -6.37533`

4) `k(5) = 4.82336`

5) `k(5) = 0.0873072`

Exercise 2

Compute the mean curvature for `X(u,v) =`
$\left\{ \left(1 + 2\,v^2\right) \text{Cos}[u], -4\left(1 + 2\,v^2\right) \text{Cos}[u] + \left(1 + 2\,v^2\right) \text{Sin}[u], v - \left(1 + 2\,v^2\right) \text{Sin}[u] \right\}$
at the point `(u,v) = (5,3)`.

1) `H(5,3) = 2.2941`

2) `H(5,3) = 4.66417`

3) `H(5,3) = 3.77696`

4) `H(5,3) = -0.0000383327`

5) `H(5,3) = -8.7755`

Exercise 3

Compute the mean curvature for `X(u,v) = {Cos[u], Sin[u], v}` at the point `(u,v) = (1,2)`.

1) `H(1,2) = -4.93214`

2) `H(1,2) = 8.53175`

3) `H(1,2) = 0.5`

4) `H(1,2) = 7.57315`

5) `H(1,2) = 3.11432`

Further Mathematics - 2023/2024
Chapter 3 - Test for serial number: 38

Exercise 1

Compute the curvature for C(t) =
{5 Cos[t] − 10 Sin[t], 5 Cos[t] − 5 Sin[t], 5 Cos[t] − 10 Sin[t]} at the point t=1.

1) k(1) = 3.34499

2) k(1) = −5.32756

3) k(1) = 0.00997602

4) k(1) = −5.55118

5) k(1) = 2.53214

Exercise 2

Compute the mean curvature for X(u,v) =
{−2 v + v Cos[u] + 2 v Sin[u], v Sin[u], −3 v + 2 v Cos[u] + 4 v Sin[u]} at the point (u,v) = (4,10).

1) H(4,10) = 8.66761

2) H(4,10) = −2.33858

3) H(4,10) = −7.65693

4) H(4,10) = 0.0364457

5) H(4,10) = 6.54023

Exercise 3

Compute the Gauss curvature for X(u,v) = {3 u, 2 u^3, v} at the point (u,v) = (7,7).

1) K(7,7) = 7.12891

2) K(7,7) = −3.72932

3) K(7,7) = 0

4) K(7,7) = −2.4413

5) K(7,7) = 0.960453

Further Mathematics - 2023/2024
Chapter 3 - Test for serial number: 39

Exercise 1

Compute the torsion for C(t) = {3 Cos[t], 3 Cos[t] - Sin[t], -2 Sin[t]} at the point t=6.

1) $\tau(6)$ = 0

2) $\tau(6)$ = -4.46808

3) $\tau(6)$ = -4.44437

4) $\tau(6)$ = 8.10031

5) $\tau(6)$ = -6.67447

Exercise 2

Compute the mean curvature for X(u,v) =
$\{u + 2 (-5 + 9 u^2 + 2 v - 6 v^2 + u (8 + v)), u + v, -5 + 9 u^2 + v - 6 v^2 + u (7 + v)\}$
at the point (u,v) = (6,-3).

1) H(6,-3) = -2.54348

2) H(6,-3) = 0.0536014

3) H(6,-3) = 0.879803

4) H(6,-3) = -4.05385

5) H(6,-3) = 1.57387

Exercise 3

Compute the Gauss curvature for X(u,v) = {Cos[u], Sin[u], v} at the point (u,v) = (5,2).

1) K(5,2) = 3.65131

2) K(5,2) = 0

3) K(5,2) = 4.75111

4) K(5,2) = -4.71847

5) K(5,2) = -2.97533

Further Mathematics - 2023/2024
Chapter 3 - Test for serial number: 40

Exercise 1

Compute the curvature for $C(t) =$
$\left\{t, 2\left(6 - 8t - 5t^2\right) + 3\left(1 - 6t + 8t^2\right), -3\left(6 - 8t - 5t^2\right) - 5\left(1 - 6t + 8t^2\right)\right\}$ at the point t=4.

1) k(4) = -0.574053

2) k(4) = -6.59262

3) k(4) = -0.88175

4) k(4) = -7.09174

5) k(4) = 0.0000433313

Exercise 2

Compute the mean curvature for $X(u,v) =$
$\left\{\left(1 + 2v^2\right) \text{Cos}[u], \left(1 + 2v^2\right) \text{Sin}[u], v + 2\left(1 + 2v^2\right) \text{Sin}[u]\right\}$ at the point $(u,v) = (2,9)$.

1) H(2,9) = -4.62783

2) H(2,9) = 0.0000263051

3) H(2,9) = 2.73972

4) H(2,9) = 0.787431

5) H(2,9) = -1.13154

Exercise 3

Compute the Gauss curvature for $X(u,v) = \{\text{Cos}[u], \text{Sin}[u], v\}$ at the point $(u,v) = (5,1)$.

1) K(5,1) = 0

2) K(5,1) = 7.59738

3) K(5,1) = -3.61969

4) K(5,1) = -5.12096

5) K(5,1) = 8.95367

Further Mathematics - 2023/2024
Chapter 3 - Test for serial number: 41

Exercise 1

Compute the torsion for $C(t) = \{-3t + Cos[t], 3t - 2Cos[t] + Sin[t], 3t\}$ at the point t=1.

1) $\tau(1) = 3.59195$

2) $\tau(1) = -6.73505$

3) $\tau(1) = 0.443437$

4) $\tau(1) = 7.98376$

5) $\tau(1) = -6.67178$

Exercise 2

Compute the mean curvature for $X(u,v) =$
$\{Cos[u] (3 + Cos[v]) - (3 + Cos[v]) Sin[u], 6 Cos[u] (3 + Cos[v]) - (3 + Cos[v]) Sin[u] - 2 Sin[v],$
$-2 Cos[u] (3 + Cos[v]) + Sin[v]\}$ at the point $(u,v) = (3,5)$.

1) $H(3,5) = -6.33955$

2) $H(3,5) = 5.61621$

3) $H(3,5) = 6.90519$

4) $H(3,5) = 0.0108266$

5) $H(3,5) = 3.3943$

Exercise 3

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

1) $K(3,7) = 3.77231$

2) $K(3,7) = -3.70102$

3) $K(3,7) = 6.25806$

4) $K(3,7) = -8.0638$

5) $K(3,7) = 0$

Further Mathematics - 2023/2024
Chapter 3 - Test for serial number: 42

Exercise 1

Compute the curvature for $C(t) =$
$\{-6t + 5\cos[t] - \sin[t], 6t - 4\cos[t] + \sin[t], 3t - 2\cos[t]\}$ at the point t=0.

1) k(0) = 3.4511

2) k(0) = 6.15034

3) k(0) = -5.62128

4) k(0) = 0.00663928

5) k(0) = -3.79191

Exercise 2

Compute the mean curvature for $X(u,v) =$
$\{2 + 6u^2 - 3v - 7u(1 + 2v), v, 1 + 3u^2 - u(4 + 7v)\}$ at the point $(u,v) = (0,4)$.

1) H(0,4) = -0.000798827

2) H(0,4) = 4.44173

3) H(0,4) = 4.70283

4) H(0,4) = -1.44202

5) H(0,4) = 1.82051

Exercise 3

Compute the mean curvature for $X(u,v) = \{u, 3u^2, v\}$ at the point $(u,v) = (1,7)$.

1) H(1,7) = 3.02855

2) H(1,7) = -1.77465

3) H(1,7) = 0.0133296

4) H(1,7) = 0.8072

5) H(1,7) = -1.12913

Further Mathematics - 2023/2024
Chapter 3 - Test for serial number: 43

Exercise 1

Compute the torsion for $C(t) = \{Cos[t], -2t + Cos[t] + Sin[t], 2t - 2Cos[t]\}$ at the point t=3.

1) $\tau(3) = -4.89589$

2) $\tau(3) = 0.0645844$

3) $\tau(3) = -6.36618$

4) $\tau(3) = -4.1775$

5) $\tau(3) = -8.14686$

Exercise 2

Compute the mean curvature for $X(u,v) =$
$\left\{ \left(1 + v^2\right) Cos[u] + 2\left(1 + v^2\right) Sin[u], -2v + \left(1 + v^2\right) Sin[u], -3v + 2\left(1 + v^2\right) Sin[u] \right\}$
at the point $(u,v) = (1,5)$.

1) $H(1,5) = 0.000994722$

2) $H(1,5) = 8.79029$

3) $H(1,5) = -1.09487$

4) $H(1,5) = 8.09713$

5) $H(1,5) = -6.76231$

Exercise 3

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

1) $H(2,3) = 6.83907$

2) $H(2,3) = 6.55003$

3) $H(2,3) = 0.0071334$

4) $H(2,3) = 8.10215$

5) $H(2,3) = -4.39024$

Further Mathematics - 2023/2024
Chapter 3 - Test for serial number: 44

Exercise 1

```
Compute the curvature for C(t) = {3 Cos[t], Sin[t], -12 Cos[t] + 2 Sin[t]} at the point t=3.
```

1) k(3) = -7.4025

2) k(3) = -2.20145

3) k(3) = 9.93915

4) k(3) = -3.83008

5) k(3) = 0.0296078

Exercise 2

```
Compute the Gauss curvature for X(u,v) =
  {4 v - v Cos[u] - 4 v Sin[u], v Sin[u], 3 v - v Cos[u] - 2 v Sin[u]} at the point (u,v) = (0,-4).
```

1) K(0,-4) = -5.25814

2) K(0,-4) = -8.62192

3) K(0,-4) = -5.991

4) K(0,-4) = -2.5255

5) K(0,-4) = 0

Exercise 3

```
Compute the Gauss curvature for X(u,v) = {Cos[u], Sin[u], v} at the point (u,v) = (6,8).
```

1) K(6,8) = -4.11146

2) K(6,8) = 5.0131

3) K(6,8) = 0

4) K(6,8) = -1.1222

5) K(6,8) = 1.40308

Further Mathematics - 2023/2024
Chapter 3 - Test for serial number: 45

Exercise 1

Compute the curvature for $C(t) = \{-2 - 7t - 6t^2, -2 - 8t - 6t^2, 6 + t - t^2\}$ at the point t=4.

1) k(4) = -8.64635

2) k(4) = -2.88117

3) k(4) = -2.94787

4) k(4) = 3.76665

5) k(4) = 0.0000818398

Exercise 2

Compute the mean curvature for $X(u,v) =$
$\{u, -2 + u^2 + u(6 - 5v) - v - v^2, u + v\}$ at the point $(u,v) = (-7,6)$.

1) H(-7,6) = -6.96602

2) H(-7,6) = -2.67351

3) H(-7,6) = -8.37197

4) H(-7,6) = -0.0196715

5) H(-7,6) = -7.07675

Exercise 3

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

1) K(5,5) = -4.56654

2) K(5,5) = 0

3) K(5,5) = -2.03053

4) K(5,5) = 5.24936

5) K(5,5) = 1.89894

Further Mathematics - 2023/2024
Chapter 3 - Test for serial number: 46

Exercise 1

Compute the torsion for C(t) =
{-t + Cos[t] + Sin[t], -t + Sin[t], -t - Cos[t] + 2 Sin[t]} at the point t=0.

1) $\tau(0) = 1.$

2) $\tau(0) = -3.16456$

3) $\tau(0) = -2.04276$

4) $\tau(0) = 8.10052$

5) $\tau(0) = -8.5019$

Exercise 2

Compute the Gauss curvature for X(u,v) =
{Cos[u] - 2 Sin[u], -v + 2 Cos[u] - 3 Sin[u], v - 2 Cos[u] + 4 Sin[u]} at the point (u,v) = (4,9).

1) K(4,9) = 0

2) K(4,9) = 3.03824

3) K(4,9) = 5.68592

4) K(4,9) = -7.91669

5) K(4,9) = -6.60523

Exercise 3

Compute the Gauss curvature for X(u,v) = $\{3\,u,\ u^3,\ v\}$ at the point (u,v) = (8,10).

1) K(8,10) = 6.34202

2) K(8,10) = 3.93565

3) K(8,10) = -8.02758

4) K(8,10) = -0.657622

5) K(8,10) = 0

Further Mathematics - 2023/2024
Chapter 3 - Test for serial number: 47

Exercise 1

Compute the curvature for $C(t) =$
$\{t - 2(8 + 7t - t^2), 8 + 7t - t^2, 2 + 3t + 7t^2 + 2(8 + 7t - t^2)\}$ at the point t=3.

1) $k(3) = -4.17481$

2) $k(3) = -6.26904$

3) $k(3) = 0.00215133$

4) $k(3) = -5.63086$

5) $k(3) = -0.998823$

Exercise 2

Compute the mean curvature for $X(u,v) =$
$\{-8v + 3(1 + 3v^2)\cos[u] - 2(1 + 3v^2)\sin[u], 2v - (1 + 3v^2)\cos[u] + (1 + 3v^2)\sin[u], v\}$
at the point $(u,v) = (4,5)$.

1) $H(4,5) = -0.00102037$

2) $H(4,5) = -8.99699$

3) $H(4,5) = -3.79247$

4) $H(4,5) = 3.67855$

5) $H(4,5) = -8.68361$

Exercise 3

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

1) $H(3,10) = 5.24319$

2) $H(3,10) = -8.4402$

3) $H(3,10) = -5.99577$

4) $H(3,10) = 1.94613$

5) $H(3,10) = 0.5$

Further Mathematics - 2023/2024
Chapter 3 - Test for serial number: 48

Exercise 1

Compute the curvature for C(t) = {-t + Cos[t], -2 t + Sin[t], 3 t - 2 Cos[t]} at the point t=4.

1) k(4) = -0.819786

2) k(4) = 5.45764

3) k(4) = 6.98344

4) k(4) = 6.11109

5) k(4) = 0.101573

Exercise 2

Compute the Gauss curvature for X(u,v) =
  {6 v + 3 v Cos[u] - v Sin[u], 2 v + v Cos[u], 7 v + 3 v Cos[u] - v Sin[u]} at the point (u,v) = (2,10).

1) K(2,10) = 4.77793

2) K(2,10) = 0

3) K(2,10) = 3.6454

4) K(2,10) = -8.17774

5) K(2,10) = -7.66017

Exercise 3

Compute the Gauss curvature for X(u,v) = {Cos[u], Sin[u], v} at the point (u,v) = (0,7).

1) K(0,7) = 0

2) K(0,7) = -3.80349

3) K(0,7) = -7.22567

4) K(0,7) = -2.39444

5) K(0,7) = -4.86008

Further Mathematics - 2023/2024
Chapter 3 - Test for serial number: 49

Exercise 1

Compute the curvature for C(t) = {Cos[t] + Sin[t], -t + Sin[t], 3 t - 2 Sin[t]} at the point t=1.

1) k(1) = 0.29351

2) k(1) = 5.98447

3) k(1) = 1.35401

4) k(1) = 4.6037

5) k(1) = -6.38381

Exercise 2

Compute the Gauss curvature for X(u,v) =
 {-v + Cos[u], 2 v - Cos[u] + Sin[u], v} at the point (u,v) = (6,-10).

1) K(6,-10) = 3.26633

2) K(6,-10) = 0

3) K(6,-10) = -8.01772

4) K(6,-10) = 6.23095

5) K(6,-10) = 4.67906

Exercise 3

Compute the mean curvature for X(u,v) = {Cos[u], Sin[u], v} at the point (u,v) = (4,3).

1) H(4,3) = 0.5

2) H(4,3) = -0.140596

3) H(4,3) = 7.32213

4) H(4,3) = -5.77858

5) H(4,3) = -5.70363

Further Mathematics - 2023/2024
Chapter 3 - Test for serial number: 50

Exercise 1

Compute the curvature for $C(t) = \{7 - 6\,t,\ -1 + 2\,(7 - 9\,t) + 2\,t + 6\,t^2,\ 1 + 3\,t - 6\,t^2\}$ at the point t=6.

1) k(6) = 4.40492

2) k(6) = -2.62711

3) k(6) = 0.000263654

4) k(6) = 2.87225

5) k(6) = -6.44647

Exercise 2

Compute the Gauss curvature for $X(u,v) =$
$\{v\,\text{Cos}[u],\ -2\,v + 3\,v\,\text{Cos}[u] + v\,\text{Sin}[u],\ v\}$ at the point $(u,v) = (5,1)$.

1) K(5,1) = 0

2) K(5,1) = -2.03881

3) K(5,1) = 7.34725

4) K(5,1) = 4.26674

5) K(5,1) = -7.4759

Exercise 3

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

1) K(9,10) = 0

2) K(9,10) = 7.62562

3) K(9,10) = -5.54262

4) K(9,10) = 8.17636

5) K(9,10) = 7.67143

Further Mathematics - 2023/2024
Chapter 3 - Test for serial number: 51

Exercise 1

Compute the torsion for $C(t) = \{-3t + Cos[t] + 2 Sin[t], -6t + Sin[t], 3t\}$ at the point t=3.

1) $\tau(3) = 2.88768$

2) $\tau(3) = 0.0814444$

3) $\tau(3) = -2.59601$

4) $\tau(3) = 5.52114$

5) $\tau(3) = -6.88142$

Exercise 2

Compute the mean curvature for $X(u,v) =$
$\{2v - Cos[u] + 2 Sin[u], 2v - Cos[u] + Sin[u], -3v + 2 Cos[u] - 2 Sin[u]\}$
at the point $(u,v) = (2,-2)$.

1) $H(2,-2) = 5.02353$

2) $H(2,-2) = 1.85572$

3) $H(2,-2) = 5.0872$

4) $H(2,-2) = 1.07495$

5) $H(2,-2) = 8.36152$

Exercise 3

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

1) $K(9,1) = -7.69288$

2) $K(9,1) = -1.7171$

3) $K(9,1) = 0$

4) $K(9,1) = 7.8762$

5) $K(9,1) = 6.18363$

Further Mathematics - 2023/2024
Chapter 3 - Test for serial number: 52

Exercise 1

Compute the curvature for $C(t) = \{2t + 3\cos[t], \sin[t], 2t + 2\cos[t] + \sin[t]\}$ at the point t=5.

1) $k(5) = 0.0311924$

2) $k(5) = -3.2959$

3) $k(5) = 2.0733$

4) $k(5) = 7.47324$

5) $k(5) = -5.42964$

Exercise 2

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

1) $H(4,-4) = -7.82403$

2) $H(4,-4) = 0.0492638$

3) $H(4,-4) = 3.06902$

4) $H(4,-4) = -2.33522$

5) $H(4,-4) = 1.34879$

Exercise 3

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

1) $H(3,2) = -5.89943$

2) $H(3,2) = 7.6873$

3) $H(3,2) = 0.5$

4) $H(3,2) = -1.04251$

5) $H(3,2) = 6.70285$

Further Mathematics - 2023/2024
Chapter 3 - Test for serial number: 53

Exercise 1

Compute the curvature for C(t)={4 Cos[t], -4 Cos[t] + 4 Sin[t], 4 Cos[t]} at the point t=5.

1) k(5) = 2.46989

2) k(5) = 0.101687

3) k(5) = -5.38975

4) k(5) = 0.93969

5) k(5) = -4.41911

Exercise 2

Compute the Gauss curvature for X(u,v) =
  {-v + Cos[u] - Sin[u], Sin[u], -v + 2 Cos[u] - Sin[u]} at the point (u,v) = (4,-2).

1) K(4,-2) = -1.66725

2) K(4,-2) = -8.75741

3) K(4,-2) = 4.23504

4) K(4,-2) = 0

5) K(4,-2) = 6.51426

Exercise 3

Compute the Gauss curvature for X(u,v) = {Cos[u], Sin[u], v} at the point (u,v) = (1,7).

1) K(1,7) = 2.11655

2) K(1,7) = -2.43941

3) K(1,7) = 3.95833

4) K(1,7) = 0

5) K(1,7) = 1.28038

Further Mathematics - 2023/2024
Chapter 3 - Test for serial number: 54

Exercise 1

Compute the curvature for $C(t) = \{Cos[t], Sin[t], 2 Sin[t]\}$ at the point t=0.

1) k(0) = 0.2

2) k(0) = 2.79488

3) k(0) = 7.97437

4) k(0) = -2.30901

5) k(0) = 1.43189

Exercise 2

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

1) H(6,10) = 3.12116

2) H(6,10) = 5.90887

3) H(6,10) = 0.243699

4) H(6,10) = 5.53544

5) H(6,10) = -4.00598

Exercise 3

Compute the mean curvature for $X(u,v) = \{2u, 3u^3, v\}$ at the point $(u,v) = (8,6)$.

1) H(8,6) = -4.79739

2) H(8,6) = 7.53507×10^{-7}

3) H(8,6) = 8.90761

4) H(8,6) = -4.79767

5) H(8,6) = -7.74055

Further Mathematics - 2023/2024
Chapter 3 - Test for serial number: 55

Exercise 1

Compute the curvature for `C(t)={Cos[t], 3t – 2 Cos[t] + Sin[t], 3t – Cos[t]}` at the point t=3.

1) k(3) = -5.23411

2) k(3) = -4.33151

3) k(3) = 1.57268

4) k(3) = 0.0960209

5) k(3) = -3.51999

Exercise 2

Compute the Gauss curvature for `X(u,v) =`
`{v Cos[u] + v Sin[u], 4 v Cos[u] + 5 v Sin[u], v}` at the point (u,v) = (6,-5).

1) K(6,-5) = -4.4201

2) K(6,-5) = -1.49933

3) K(6,-5) = 5.9879

4) K(6,-5) = 0

5) K(6,-5) = -0.711773

Exercise 3

Compute the mean curvature for `X(u,v)={Cos[u], Sin[u], v}` at the point (u,v)=(6,5).

1) H(6,5) = 1.65495

2) H(6,5) = 0.5

3) H(6,5) = -2.23578

4) H(6,5) = 8.70532

5) H(6,5) = -2.40318

Further Mathematics - 2023/2024
Chapter 3 - Test for serial number: 56

Exercise 1

Compute the torsion for $C(t) = \{-1 + 11t - 4t^2, -5 + 6t - 7t^2, -4 - 4t - 3t^2\}$ at the point t=8.

1) $\tau(8) = -6.69264$

2) $\tau(8) = -5.48448$

3) $\tau(8) = 0$

4) $\tau(8) = 6.13372$

5) $\tau(8) = 8.16085$

Exercise 2

Compute the Gauss curvature for $X(u,v) =$
$\{\text{Cos}[u] (4 + \text{Cos}[v]), -\text{Cos}[u] (4 + \text{Cos}[v]) + (4 + \text{Cos}[v]) \text{Sin}[u] + \text{Sin}[v],$
$-\text{Cos}[u] (4 + \text{Cos}[v]) + \text{Sin}[v]\}$ at the point $(u,v) = (6,2)$.

1) $K(6,2) = 2.08097$

2) $K(6,2) = -8.56128$

3) $K(6,2) = 5.41205$

4) $K(6,2) = -0.14265$

5) $K(6,2) = 2.35585$

Exercise 3

Compute the Gauss curvature for $X(u,v) = \{3u, 2u^3, v\}$ at the point $(u,v) = (7,4)$.

1) $K(7,4) = 0.545536$

2) $K(7,4) = 1.9179$

3) $K(7,4) = -8.36256$

4) $K(7,4) = 0$

5) $K(7,4) = 1.21231$

Further Mathematics - 2023/2024
Chapter 3 - Test for serial number: 57

Exercise 1

Compute the torsion for C(t)={8 Cos[t], 5 Sin[t], -4 Cos[t]} at the point t=4.

1) τ(4) = -8.7119

2) τ(4) = 0.671562

3) τ(4) = 0

4) τ(4) = 5.58778

5) τ(4) = -6.4338

Exercise 2

Compute the mean curvature for X(u,v) =
{v Cos[u], 2 v - 2 v Cos[u] + v Sin[u], v} at the point (u,v)=(6,4).

1) H(6,4) = 0.858366

2) H(6,4) = -0.422624

3) H(6,4) = -8.44219

4) H(6,4) = 5.92863

5) H(6,4) = -2.079

Exercise 3

Compute the Gauss curvature for X(u,v)={Cos[u], Sin[u], v} at the point (u,v)=(6,8).

1) K(6,8) = 6.096

2) K(6,8) = 0

3) K(6,8) = -2.32769

4) K(6,8) = -2.39363

5) K(6,8) = -1.41814

Further Mathematics - 2023/2024
Chapter 3 - Test for serial number: 58

Exercise 1

Compute the torsion for $C(t) = \{-1 - 4t - 5t^2 + 3(7 + 2t^2),$
$2t + 2(-1 - 5t - 5t^2) + 7(7 + 2t^2), -1 - 5t - 5t^2 + 2(7 + 2t^2)\}$ at the point t=2.

1) $\tau(2) = -0.547348$

2) $\tau(2) = -1.99427$

3) $\tau(2) = 1.45071$

4) $\tau(2) = 2.73161$

5) $\tau(2) = 0$

Exercise 2

Compute the mean curvature for $X(u,v) =$
$\{Cos[u] (3 + 2 Cos[v]) + 2 (3 + 2 Cos[v]) Sin[u] - 2 Sin[v], 2 Cos[u] (3 + 2 Cos[v]) +$
$(3 + 2 Cos[v]) Sin[u], -((3 + 2 Cos[v]) Sin[u]) + Sin[v]\}$ at the point $(u,v) = (6,4)$.

1) $H(6,4) = -0.901101$

2) $H(6,4) = 0.140403$

3) $H(6,4) = -6.33978$

4) $H(6,4) = -7.15175$

5) $H(6,4) = -5.965$

Exercise 3

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

1) $H(8,8) = 8.8782$

2) $H(8,8) = 2.23258$

3) $H(8,8) = 6.72679$

4) $H(8,8) = 5.87167$

5) $H(8,8) = 3.3907 \times 10^{-6}$

Further Mathematics - 2023/2024
Chapter 3 - Test for serial number: 59

Exercise 1

Compute the torsion for $C(t) = \{6\,t + Cos[t], Sin[t], 2\,t\}$ at the point t=1.

1) $\tau(1) = 0.0980729$

2) $\tau(1) = 5.63581$

3) $\tau(1) = 0.610532$

4) $\tau(1) = 5.08741$

5) $\tau(1) = 2.72442$

Exercise 2

Compute the mean curvature for $X(u,v) =$
$\left\{\left(1 + v^2\right) Cos[u], \left(1 + v^2\right) Sin[u], v + 2\left(1 + v^2\right) Cos[u]\right\}$ at the point $(u,v) = (3,-8)$.

1) $H(3,-8) = -8.49739$

2) $H(3,-8) = 0.896258$

3) $H(3,-8) = 2.18142$

4) $H(3,-8) = -2.27611$

5) $H(3,-8) = 0.000184711$

Exercise 3

Compute the Gauss curvature for $X(u,v) = \{Cos[u], Sin[u], v\}$ at the point $(u,v) = (1,5)$.

1) $K(1,5) = 4.7705$

2) $K(1,5) = 7.97713$

3) $K(1,5) = -7.27851$

4) $K(1,5) = 0$

5) $K(1,5) = 2.47999$

Further Mathematics - 2023/2024
Chapter 3 - Test for serial number: 60

Exercise 1

Compute the torsion for $C(t) = \{-3t - 2(-7 - 7t + 5t^2) + 3(-8 - 5t + 9t^2),$
$-8 - 5t + 9t^2, 5t + 3(-7 - 7t + 5t^2) - 4(-8 - 5t + 9t^2)\}$ at the point t=7.

1) $\tau(7) = 2.74222$

2) $\tau(7) = -5.15807$

3) $\tau(7) = 0$

4) $\tau(7) = -4.97187$

5) $\tau(7) = -1.37126$

Exercise 2

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

1) $K(1,2) = 0.734561$

2) $K(1,2) = -7.30545$

3) $K(1,2) = 8.82824$

4) $K(1,2) = -8.46715$

5) $K(1,2) = -0.00130613$

Exercise 3

Compute the mean curvature for $X(u,v) = \{Cos[u], Sin[u], v\}$ at the point $(u,v) = (4,9)$.

1) $H(4,9) = 7.72648$

2) $H(4,9) = 2.95356$

3) $H(4,9) = 3.31109$

4) $H(4,9) = 0.5$

5) $H(4,9) = 4.2543$