

Name _____

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.**Compute the gradient of the function at the given point.**

1) $f(x, y, z) = \ln(x^2 - 5y^2 + 8z^2)$, $(-5, -5, -5)$

1) _____

A) $\frac{1}{16}\mathbf{i} + \frac{1}{2}\mathbf{j} - \frac{4}{5}\mathbf{k}$

B) $-\frac{1}{10}\mathbf{i} + \frac{1}{2}\mathbf{j} - \frac{5}{16}\mathbf{k}$

C) $\frac{1}{16}\mathbf{i} + \frac{1}{2}\mathbf{j} - \frac{5}{16}\mathbf{k}$

D) $-\frac{1}{10}\mathbf{i} + \frac{1}{2}\mathbf{j} - \frac{4}{5}\mathbf{k}$

Find the derivative of the function at the given point in the direction of A.

2) $f(x, y) = -5x^2 + 7y$, $(9, -2)$, $A = 3\mathbf{i} - 4\mathbf{j}$

2) _____

A) $-\frac{298}{5}$

B) $-\frac{388}{5}$

C) $-\frac{568}{5}$

D) $-\frac{478}{5}$

Answer the question.

3) Find the direction in which the function is increasing or decreasing most rapidly at the point P_0 .

3) _____

$f(x, y) = xy^2 - yx^2$, $P_0(-1, 2)$

A) $\left(\frac{-5}{\sqrt{89}}\right)\mathbf{i} + \left(\frac{8}{\sqrt{89}}\right)\mathbf{j}$

B) $\left(\frac{8}{\sqrt{89}}\right)\mathbf{i} + \left(\frac{5}{\sqrt{89}}\right)\mathbf{j}$

C) $(8\sqrt{89})\mathbf{i} + (-5\sqrt{89})\mathbf{j}$

D) $\left(\frac{8}{\sqrt{89}}\right)\mathbf{i} + \left(\frac{-5}{\sqrt{89}}\right)\mathbf{j}$

Solve the problem.

4) Find the derivative of the function $f(x, y) = x^2 + xy + y^2$ at the point $(-2, -1)$ in the direction in which the function decreases most rapidly.

4) _____

A) $-\sqrt{41}$

B) $-\sqrt{77}$

C) $-3\sqrt{6}$

D) $-\sqrt{83}$

5) Write an equation for the tangent line to the curve $xy = 60$ at the point $(10, 6)$.

5) _____

A) $10x + 6y = 60$

B) $10x + 6y = 120$

C) $6x + 10y = 60$

D) $6x + 10y = 120$

6) Find parametric equations for the normal line to the surface $9x - 8y + 7z = 31$ at the point $(1, -1, 2)$.

6) _____

A) $x = -t + 9$, $y = t - 8$, $z = -2t + 7$

B) $x = t + 9$, $y = -t - 8$, $z = 2t + 7$

C) $x = 9t + 1$, $y = -8t - 1$, $z = 7t + 2$

D) $x = 9t - 1$, $y = -8t + 1$, $z = 7t - 2$

Find the extreme values of the function subject to the given constraint.

7) $f(x, y) = xy$, $x^2 + y^2 = 128$

7) _____

A) Maximum: 64 at $(8, 8)$; minimum: 0 at $(0, 0)$

B) Maximum: 64 at $(8, -8)$ and $(-8, 8)$; minimum: -64 at $(8, 8)$ and $(-8, -8)$

C) Maximum: 64 at $(8, 8)$ and $(-8, -8)$; minimum: -64 at $(8, -8)$ and $(-8, 8)$

D) Maximum: 64 at $(8, 8)$; minimum: -64 at $(-8, -8)$

8) $f(x, y, z) = x + 2y - 2z$, $x^2 + y^2 + z^2 = 9$

8) _____

A) Maximum: 1 at $(1, -2, -2)$; minimum: -1 at $(-1, 2, 2)$

B) Maximum: 8 at $(2, 1, -2)$; minimum: -8 at $(-2, -1, 2)$

C) Maximum: 9 at $(1, 2, -2)$; minimum: -9 at $(-1, -2, 2)$

D) Maximum: 1 at $(-1, -2, -3)$; minimum: -1 at $(1, 2, 3)$

Answer Key

Testname: 283-EXAM2-CH12MINUSQUIZ

- 1) D
- 2) A
- 3) D
- 4) A
- 5) D
- 6) C
- 7) C
- 8) C