Exam

Name_____

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

Provide an appropriate response.

1) If $x^2 + xy + yz + z^2 = 6$, then $\frac{\partial z}{\partial y}$ = 1) _____

A) $-\frac{x+z}{2z}$ B) $-\frac{y+3z}{y}$ C) $-\frac{x+2z}{x+2y}$ D) $-\frac{x+2z}{y}$ E) $-\frac{x+z}{y+2z}$

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

2) If $x^2y + xz + z^2 = 4$, find $\frac{\partial z}{\partial x}$. 2) _____

3) Use implicit partial differentiation to find $\frac{\partial z}{\partial x}$ from $\ln(xyz) = e^y + 79$. 3) _____

4) Use implicit partial differentiation to find $\frac{\partial z}{\partial y}$ from $e^{xy} + 7x^3 + 8z - 19 = 0$. 4) _____

5) For $2x^2 + 3y^2 + 2z^2 = 16$, evaluate $\frac{\partial z}{\partial y}$ when $x = 1, y = 2, z = -1$. 5) _____

6) For $x^2y + xz + z^2 = 4$, evaluate $\frac{\partial z}{\partial x}$ when $x = -1, y = 2, z = -1$. 6) _____

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

7) For $s^3t^3 + 2r^2 - s^2 = 2$, the partial derivative $\frac{\partial t}{\partial r}$ evaluated at $r = 1, s = 1, t = 1$ is 7) _____

A) 4.
B) 0.
C) -2.
D) $-\frac{4}{3}$.
E) none of the above

8) For $x^2 + xy + yz + z^2 = 6$, the partial derivative $\frac{\partial z}{\partial y}$ evaluated at $x = 1, y = 2, z = 1$ is 8) _____

A) -1 B) $-\frac{3}{5}$ C) $-\frac{5}{2}$ D) $-\frac{3}{2}$ E) $-\frac{1}{2}$

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

9) For $\ln(xyz) + e = e^y + 1$, the partial derivative $\frac{\partial z}{\partial x}$ evaluated at $x = e^{-2}, y = 1, z = e^3$ 9) _____

10) For $e^{xy} + 7x^3 + 8z - 18 = 0$, the partial derivative $\frac{\partial z}{\partial y}$ evaluated at $x = -1$, $y = 0$, $z = 3$ is 10) _____

11) If $w = f(x, y, z) = x^2yz - yz^2 + xz^2$, find: 11) _____

(a) $\frac{\partial w}{\partial x}$

(b) $\frac{\partial w}{\partial y}$

(c) $\frac{\partial w}{\partial z}$

(d) $\frac{\partial^2 w}{\partial y^2}$

(e) $\frac{\partial^2 w}{\partial x \partial z}$

12) If $w = f(x, y, z) = 2x^2y + 3xy^2z^2 + 4xz^3$, find: 12) _____

(a) $\frac{\partial w}{\partial x}$

(b) $\frac{\partial w}{\partial y}$

(c) $\frac{\partial w}{\partial z}$

(d) $\frac{\partial^2 w}{\partial y^2}$

(e) $\frac{\partial^2 w}{\partial x \partial z}$

13) If $f(x, y) = e^{xy}$, find: 13) _____

(a) $f_x(x, y)$

(b) $f_{xx}(x, y)$

(c) $f_{xy}(x, y)$

14) If $f(x, y) = 2x^4y^3 - 3x^3y^3 + 4xy - x + 2y + 4$, find: 14) _____

(a) $f_x(x, y)$

(b) $f_y(x, y)$

(c) $f_{xy}(x, y)$

(d) $f_{xy}(-1, 1)$

(e) $f_{yyx}(x, y)$

15) If $w = z(x^2 + 3xy)^3$, find: 15) _____

(a) $\frac{\partial w}{\partial x}$

(b) $\frac{\partial w}{\partial y}$

(c) $\frac{\partial w}{\partial z}$

(d) $\frac{\partial^2 w}{\partial z^2}$

(e) $\frac{\partial^2 w}{\partial x \partial y}$

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

16) If $f(x, y) = x^2y$, then $f_{yx}(1, 0) =$ 16) _____

A) 1. B) 2. C) 3. D) 4. E) 0.

17) If $g(u, v, w) = (u^2 + 3v)^2(4w - 5)$, then $g_{wu}(-1, 1, 3) =$ 17) _____

A) 16. B) 32. C) 64. D) -32. E) -64.

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

18) Let $f(x, y) = 3xy^3 + 5e^{3xy}$. Find: $\frac{\partial^2 f}{\partial x^2}, \frac{\partial^2 f}{\partial y^2}, \frac{\partial^2 f}{\partial x \partial y}$ 18) _____

19) Let $f(x, y) = x^2e^{3y} + y^3 \ln 2x$. Find: $\frac{\partial^2 f}{\partial x^2}, \frac{\partial^2 f}{\partial y^2}, \frac{\partial^2 f}{\partial y \partial x}$ 19) _____

20) The Cobb-Douglas production function for a company is given by $P = 20l^{1/3}k^{2/3}$, where P is the monthly production value when k is the amount of the company's capital investment (in dollars per month) and l is the size of the labor force (in work hours per month). Find P_{ll} and P_{lk}. 20) _____

21) The Cobb-Douglas production function for a company is given by $P = 70l^{1/4}k^{3/4}$, where P is the monthly production value when k is the amount of the company's capital investment (in dollars per month) and l is the size of the labor force (in work hours per month). Find P_{kk} and P_{kl}. 21) _____

22) If $z = (x^2 + y^2)^{10}$ where $x = 4r^2s^3$ and $y = e^{2r+3s-3}$, then by means of the chain rule, (a) find $\frac{\partial z}{\partial r}$; 22) _____

(b) evaluate $\frac{\partial z}{\partial r}$ when $r = 0$ and $s = 1$.

23) If $z = 2x^2y + 3xy + y^2$ where $x = r^2 + 2rs$ and $y = 2r - 4s$, then by means of the chain rule, (a) find $\frac{\partial z}{\partial s}$; 23) _____

(b) evaluate when $r = 1$ and $s = 0$.

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

24) If $z = x^3y^2 + x^2y^3 - 3xy$ and $x = 2r + 3s$ and $y = r - s$, then $\frac{\partial z}{\partial s}$ when $r = 1$ and $s = 0$ is 24) _____

A) 35. B) 8. C) 1. D) 5. E) 17.

25) If $z = (2x + 3y)^3$ and $x = r^2 - 2s$ and $y = 2s - r$, then $\frac{\partial z}{\partial s}$ when $r = 2$ and $s = 1$ is 25) _____

A) 104. B) 92. C) 84. D) 96. E) 88.

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

26) If $z = x^2e^y + y^2e^x$ where $x = 2rs^2$ and $y = \ln r^2 + \ln s^2$, find $\frac{\partial z}{\partial s}$. 26) _____

27) If $z = 10x + 5y$ and $x = 2rs$; $y = 3r + 5s$ find: 27) _____

(a) $\frac{\partial z}{\partial r}$

(b) $\frac{\partial z}{\partial s}$

28) If $z = x\sqrt{y}$ and $x = \frac{2r}{s}$; $y = 4r^2s$ find: 28) _____

(a) $\frac{\partial z}{\partial r}$

(b) $\frac{\partial z}{\partial s}$

29) If $z = e^{xy}$ and $x = \sqrt{rs}$; $y = \ln (r + s)$ find: 29) _____

(a) $\frac{\partial z}{\partial r}$

(b) $\frac{\partial z}{\partial s}$