

Note: Where necessary, rewrite functions into the form: $F(x,y,z)=0$
and use implicit function Theorem.

For Multiple choice, SHOW your work

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

1) 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 1) _____

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

2) 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 2) _____

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

3) If $x^2 + xy + yz + z^2 = 6$, then $\frac{\partial z}{\partial y} =$ 3) _____

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

4) If $s^3t^3 + 2r^2 - s^2 = 1$, then $\frac{\partial t}{\partial r} =$ 4) _____

A) $-\frac{4r}{3s^3t^2}$.

B) $\frac{r-3s^2}{t}$.

C) $4r$.

D) $\sqrt[3]{\frac{1-2r^2+s^2}{s^3}}$.

E) none of the above

5) 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 5) _____

A) 0.

B) -2.

C) 4.

D) $-\frac{4}{3}$.

E) none of the above

6) 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 6) _____

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

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

7) Find y' if $3x^2 - 7y^2 = 8$. 7) _____

- 8) Find y' if $xy = y^2 + 1$. 8) _____
- 9) Find an equation of the tangent line to the curve $x^2 + y + y^2 = 13$ at the point $(-1, 3)$. 9) _____
- 10) The demand equation for a product is $p = 400 - 0.2q^2$. Find the rate of change of quantity with respect to price. 10) _____
- 11) Suppose $p = 500 - 0.01q - 0.02\sqrt{q}$ is the demand equation for a product. Find the rate of change of quantity with respect to price. 11) _____
- 12) If $2x^2 + 3y^2 + 2z^2 = 16$, find $\frac{\partial z}{\partial y}$. 12) _____
- 13) If $x^2y + xz + z^2 = 4$, find $\frac{\partial z}{\partial x}$. 13) _____
- 14) For $2x^2 + 3y^2 + 2z^2 = 16$, evaluate $\frac{\partial z}{\partial y}$ when $x = 1, y = 2, z = -1$. 14) _____
- 15) 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 $\frac{\partial z}{\partial s}$; (b) evaluate when $r = 1$ and $s = 0$. 15) _____