

1. (1 pt)

Find the partial derivatives of the function

$$f(x,y) = \frac{-9x - 1y}{-7x + 2y}$$

$$f_x(x,y) = \underline{\hspace{2cm}}$$

$$f_y(x,y) = \underline{\hspace{2cm}}$$

2. (1 pt)

Find the partial derivatives of the function

$$w = \sqrt{8r^2 + 5s^2 + 5t^2}$$

$$\frac{\partial w}{\partial r} = \underline{\hspace{2cm}}$$

$$\frac{\partial w}{\partial s} = \underline{\hspace{2cm}}$$

$$\frac{\partial w}{\partial t} = \underline{\hspace{2cm}}$$

3. (1 pt)

Find the partial derivatives of the function

$$f(x,y) = \int_y^x \cos(9t^2 - 9t - 4) dt$$

$$f_x(x,y) = \underline{\hspace{2cm}}$$

$$f_y(x,y) = \underline{\hspace{2cm}}$$

4. (1 pt)

Find the partial derivatives of the function

$$f(x,y) = xye^{7y}$$

You should as a by product verify that the function f satisfies Clairaut's theorem.

$$f_x(x,y) = \underline{\hspace{2cm}}$$

$$f_y(x,y) = \underline{\hspace{2cm}}$$

$$f_{xy}(x,y) = \underline{\hspace{2cm}}$$

$$f_{yx}(x,y) = \underline{\hspace{2cm}}$$

5. (1 pt)

The gas law for a fixed mass m of an ideal gas at absolute temperature T , pressure P , and volume V is $PV = mRT$, where R is the gas constant.

Find the partial derivatives

$$\frac{\partial P}{\partial V} = \underline{\hspace{2cm}}$$

$$\frac{\partial V}{\partial V} = \underline{\hspace{2cm}}$$

$$\frac{\partial T}{\partial T} = \underline{\hspace{2cm}}$$

$$\frac{\partial T}{\partial T} = \underline{\hspace{2cm}}$$

$$\frac{\partial P}{\partial P} = \underline{\hspace{2cm}}$$

$$\frac{\partial P}{\partial V} \frac{\partial V}{\partial T} \frac{\partial T}{\partial P} = \underline{\hspace{2cm}} \text{ (an integer)}$$

$$\frac{\partial P}{\partial V} \frac{\partial V}{\partial T} \frac{\partial T}{\partial P} = \underline{\hspace{2cm}} \text{ (an integer)}$$

6. (1 pt)

Find the first partial derivatives of $f(x,y,z) = z \arctan(\frac{y}{x})$ at the point $(1, 1, -2)$.

A. $\frac{\partial f}{\partial x}(1, 1, -2) = \underline{\hspace{2cm}}$

B. $\frac{\partial f}{\partial y}(1, 1, -2) = \underline{\hspace{2cm}}$

C. $\frac{\partial f}{\partial z}(1, 1, -2) = \underline{\hspace{2cm}}$

7. (1 pt)

Find the first partial derivatives of $f(x,y) = \sin(x - y)$ at the point $(-5, -5)$.

A. $f_x(-5, -5) = \underline{\hspace{2cm}}$

B. $f_y(-5, -5) = \underline{\hspace{2cm}}$

8. (1 pt) Let $z = \sqrt{3x + 5y}$. Then:

The rate of change in z at $(1,5)$ as we change x but hold y fixed is _____, and

The rate of change in z at $(1,5)$ as we change y but hold x fixed is _____.