

Answer the following question in the space provided. There is no need to justify your answers. This quiz is worth 5 points.

Find f_{wx} if $f(w, x, y, z) = (w^2xy^2 + xy^3z^2 + wz^2y)^3$.

We will compute this as f_{xxw}

$$f_x = 3(w^2xy^2 + xy^3z^2 + wz^2y)^2(w^2y^2 + y^3z^2)$$

$$f_{xx} = 6(w^2xy^2 + xy^3z^2 + wz^2y)(w^2y^2 + y^3z^2)^2$$

$$f_{xxw} = 6(w^2xy^2 + xy^3z^2 + wz^2y)(2(w^2y^2 + y^3z^2)(2wy^2)$$

$$+ 6(2wx y^2 + z^2y)(w^2y^2 + y^3z^2)^2$$

$$= 6(w^2y^2 + y^3z^2) \left[(4wy^2)(w^2xy^2 + xy^3z^2 + wz^2y) + (2wx y^2 + z^2y)(w^2y^2 + y^3z^2) \right]. \checkmark$$

Answer the following question in the space provided. There is no need to justify your answers. This quiz is worth 5 points.

Find f_{yxy} if $f(x, y) = (2x + y^2)^{1/2}$.

We will compute this as f_{xyy} .

$$f_x = \frac{1}{2} (2x + y^2)^{-1/2} (2) = (2x + y^2)^{-1/2}$$

$$f_{xy} = -\frac{1}{2} (2x + y^2)^{-3/2} (2y) = -y (2x + y^2)^{-3/2}$$

$$f_{xyy} = \frac{3}{2} y (2x + y^2)^{-5/2} (2y) - (2x + y^2)^{-3/2}$$

$$= 3y^2 (2x + y^2)^{-5/2} - (2x + y^2)^{-3/2} \quad (*)$$

$$= \frac{3y^2 - (2x + y^2)}{(2x + y^2)^{5/2}} = \frac{2y^2 - 2x}{(2x + y^2)^{5/2}}$$

(*) This form is fine.

No further simplification is required.

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Answer the following question in the space provided. There is no need to justify your answers. This quiz is worth 5 points.

Let $g(x, y, z) = 2x^2y - 3xz^4 + 10y^2z^3$. Verify that $g_{xy} = g_{yx}$ and that $g_{zy} = g_{yz}$.

$$g_x = 4xy - 3z^4$$

$$g_y = 2x^2 + 20yz^3$$

$$g_{xy} = 4x$$

$$g_{yx} = 4x \quad \checkmark$$

$$g_z = -12xz^3 + 30y^2z^2$$

$$g_{zy} = 60yz^2 +$$

$$g_{yz} = 60yz^2 \quad \checkmark$$