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

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

We will compute this as \( f_{wxx} \):

\[
\begin{align*}
\frac{\partial f}{\partial w} &= 3(w^2xy^2 + xy^3z^2 + w^2y)(w^2y^2 + y^3z^2) \\
\frac{\partial^2 f}{\partial w^2} &= 6(w^2xy^2 + xy^3z^2 + w^2y)(w^2y^2 + y^3z^2)^2 \\
\frac{\partial^2 f}{\partial w^2 \partial w} &= 6(w^2xy^2 + xy^3z^2 + w^2y)(2(w^2y^2 + y^3z^2))(2w) \\
&+ 6(2wxy^2 + z^2y)(w^2y^2 + y^3z^2)^2 \\
&= 6(w^2y^2 + y^3z^2)[4wy^2(w^2xy^2 + xy^3z^2 + w^2y) \\
&+ (2wxy^2 + z^2y)(w^2y^2 + y^3z^2)] .
\end{align*}
\]
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 $f_{x y y}$.

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

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

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

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

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

This form is fine.
No further simplification is required.
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 $g_{yz} = g_{yz}$.

$$
g_x = 4xy - 3z^4 \quad \quad \quad g_y = 2x^2 + 20y^2z^3
$$

$$
g_{xy} = 4x \quad \quad \quad g_{yx} = 4x \quad \quad \quad \quad \text{✓}
$$

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

$$
g_{zx} = 60yz^2 \quad \quad \quad g_{yz} = 60y^2z \quad \quad \quad \text{✓}
$$