

Math 233 - Quiz 8

October 23, 2025

Name key

Score _____

Show all work to receive full credit. Supply explanations when necessary.

1. (4 points) Identify each quadric surface.

(a) $4x^2 - 8y^2 + 9z = 1$ Fix $x \rightarrow$ PARABOLAS, Fix $y \rightarrow$ HYPERBOLAS, Fix $z \rightarrow$ HYPERBOLAS
HYPERBOLIC PARABOLOID

(b) $5x^2 - 6y + 5z^2 = 0$
 $y = \frac{1}{6}(5x^2 + 5z^2)$ PARABOLOID

(c) $-x^2 + 13y^2 - 3z^2 = 144$ Fix $x \rightarrow$ HYPERBOLAS, Fix $y \rightarrow$ ELLIPSES, Fix $z \rightarrow$ HYPERBOLAS
 $x^2 + 3z^2 = 13y^2 - 144$ HYPERBOLOID OF TWO SHEETS

(d) $(x-1)^2 + 4(y+2)^2 + z^2 = 1$
ELLIPSOID

2. (2 points) Identify and describe the graph of the equation $z + 1 = x^2 + \frac{y^2}{4}$.

$$z = x^2 + \frac{1}{4}y^2 - 1$$

THE GRAPH IS AN ELLIPTICAL PARABOLOID OPENING
UP THE Z-AXIS WITH VERTEX AT $(0, 0, -1)$.
CROSS-SECTIONAL ELLIPSES ARE PILED UP THE Z-AXIS.

3. (2 points) Identify and describe the graph of the equation $z = \sqrt{x^2 + y^2}$.

$$z^2 = x^2 + y^2$$

CIRCULAR
CONE
WITH CIRCLES
UP Z-AXIS

$$z = \sqrt{x^2 + y^2}$$

THE GRAPH IS THE UPPER HALF
($z \geq 0$) OF THE CIRCULAR CONE.

THE "VERTEX" IS AT $(0, 0, 0)$ AND
THE CROSS SECTIONS UP THE Z-AXIS
ARE CIRCLES.

4. (2 points) Let $f(x, y) = x^2 e^{xy}$. Find f_x and f_y .

$$f_x(x, y) = 2x e^{xy} + x^2 y e^{xy}$$

$$f_y(x, y) = x^3 e^{xy}$$