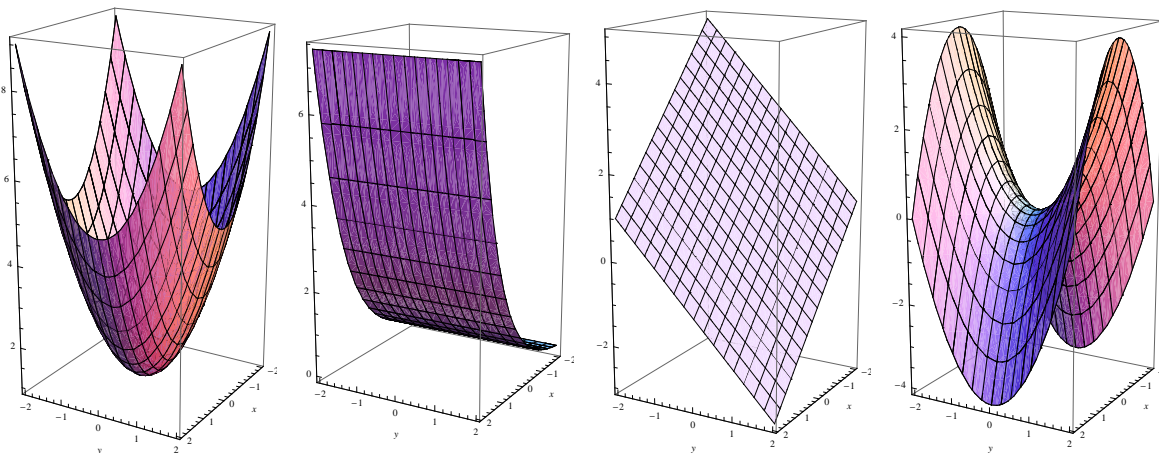# MATH 20C: FUNDAMENTALS OF CALCULUS II
QUIZ #7

Problem 1. Label each graph below with the corresponding equation.

    (a) $f(x,y) = 1 - x - y$.
    (b) $f(x,y) = y^2 - x^2$.
    (c) $f(x,y) = e^x$.
    (d) $f(x,y) = x^2 + y^2 + 1$.

Solution. The answer is (d), (c), (a), (b).

Problem 2. Describe the cross section of $f(x,y) = 1 + 2\sqrt{x^2 + y^2}$ at $z = 3$.

Solution. We have $z = f(x,y) = 1 + 2\sqrt{x^2 + y^2} = 3$, so $2\sqrt{x^2 + y^2} = 2$ or $\sqrt{x^2 + y^2} = 1$ so by squaring we get $x^2 + y^2 = 1$: this is a circle of radius 1 centered at the origin.

Problem 3. Compute the partial derivatives $\dfrac{\partial f}{\partial x}, \dfrac{\partial f}{\partial y}$ of $f(x,y) = xy^4 - x^5 y^2 + 15$ and evaluate them at the point $(0,1)$.

Solution. We compute:

$$\frac{\partial f}{\partial x} = y^4 - 5x^4 y^2$$
$$\frac{\partial f}{\partial y} = 4xy^3 - 2x^5 y$$

so

$$\left.\frac{\partial f}{\partial x}\right|_{(0,1)} = 1$$
$$\left.\frac{\partial f}{\partial y}\right|_{(0,1)} = 0$$

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