Math 233 - Homework 3

March 4, 2021

Name _____

Score _____

The following problems are from the suggested homework. Show all work to receive full credit. Supply explanations when necessary. This assignment is due on March 11.

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1. (1 point) Determine the domain of each function.

   (a) $f(x, y) = 4\ln(y^2 - x)$

   (b) $z = \sqrt{100 - 4x^2 - 25y^2}$

2. (1 point) Determine the range of $g(x, y) = \sqrt{16 - 4x^2 - y^2}$.

3. (1 point) Describe the level surface $w(x, y, z) = 4$ when $w(x, y, z) = x^2 + y^2 - z^2$.

Turn over.

4. (2 points) Use algebraic techniques to find the limit: $\lim_{(x,y)\to(0,0)} \dfrac{x^2 - xy}{\sqrt{x} - \sqrt{y}}$

5. (2 points) Show that the limit does not exist: $\lim_{(x,y)\to(0,0)} \dfrac{x^2 y}{x^4 + y^2}$

6. (2 points) Let $z = x^2 + 3xy + 2y^2$. Find $\dfrac{\partial^2 z}{\partial x^2}$ and $\dfrac{\partial^2 z}{\partial y^2}$.