

Quiz 4

Name: _____ Section and/or TA: _____

Answer all questions in a clear and concise manner. Unsupported answers will receive no credit.

1. (2 points) Let $h(x, y) = \sqrt{25 - x^2 - y^2}$.

(a) (1 point) What is the domain of $h(x, y)$?

$$\text{Solution: } D = \{(x, y) \mid 25 - x^2 - y^2 \geq 0\} = \{(x, y) \mid x^2 + y^2 \leq 25\}$$

(b) (1 point) Describe the level curves of $h(x, y)$.

Solution: The level curves of $h(x, y)$ have the form $k = \sqrt{25 - x^2 - y^2}$ or $x^2 + y^2 = 25 - k^2$. Thus the level curves are circles with center $(0, 0)$ and radius $\sqrt{25 - k^2}$.

2. (3 points) Let $f(x, y) = 5x^4y + 2x^3y^2 - 3x + y$. Verify that $f_{xy} = f_{yx}$.

$$\text{Solution: } \begin{array}{ll} f_x = 20x^3y + 6x^2y^2 - 3 & f_y = 5x^4 + 4x^3y + 1 \\ f_{xy} = 20x^3 + 12x^2y & f_{yx} = 20x^3 + 12x^2y \end{array}$$