

Quiz 6 Math 2202

Guidelines

- This quiz is for you to test yourself on what we've been studying recently.
 - You have 10 minutes. As a section, we will go over the quiz (or part of it). Solutions will be posted online as well.
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1. Let $f(x, y) = \sin(-xy) + y^2$.
 - (a) Compute $f_x(\frac{\pi}{4}, -1)$. What information does it tell us about the graph of $z = f(x, y)$? Interpret it in words. (Draw a sketch in the appropriate plane parallel to one of the coordinate planes.)
 - (b) Compute $f_{xx}(x, y)$. What is the sign of $f_{xx}(\frac{\pi}{4}, -1)$? What does it mean?
 - (c) Find an equation for the tangent plane to the surface $z = f(x, y)$ at the point

$$P = (\frac{\pi}{4}, -1, \frac{\sqrt{2}}{2} + 1).$$

Please turn over.

2. (a) Which of the following functions describes a two dimensional surface lying in \mathbf{R}^3 ? (In other words, which has a graph which is a 2-D surface?)
- (b) Which function, if any, describes a plane in \mathbf{R}^3 ?
- (c) Which function, if any, describes the surface of a hemisphere in \mathbf{R}^3 ?
- (d) Which function, if any, has level curves which are hyperbolas?
- (e) Which function, if any, has level curves which are lines?
- A. $f(x, y, z) = \sqrt{x^2 + y^2 + z^2}$
- B. $g(x, y) = \sqrt{9 - x^2 - y^2}$
- C. $h(x, y) = 2x - 3y + 7$
- D. $k(x, y, z) = 2x - 3y + 6z + 7$
- E. $m(x, y) = \sqrt{x^2 + y^2}$
- F. $n(x, y) = 3x^2 - y^2$

Think about it... For the functions above which do *not* describe a two-dimensional surface in \mathbf{R}^3 , how can you think about visualizing them? (Hint: If they are 3-dimensional spaces, use the idea of *level surfaces* - fixing the output as a value of k and thinking about what type of object you have.)