

First Examination

Monday, February 11, 2008

Instructions: This exam should be done on your own paper. Your name should be on each sheet and on the back of the last sheet; the answers should appear written carefully and in order. If in doubt, show intermediate steps: Full credit may not be given, even for correct answers, unless work is arranged clearly and explained. This exam is closed book. You may leave after handing in your exam paper, but be sure to check your answers carefully. Each entire problem is worth 14 points, while 2 points are free.

1. You are at the point $(1, -1, 1)$, standing upright and facing the xz -plane. You walk 3 units, turn left, walk 1 unit, then slide 1 unit down a vertical pole. What are the coordinates of your position at that point?
2. Write down an expression for the linear function whose graph contains the point $(0, 0, -3)$, with slope in the x -direction equal to 4, and with slope in the y -direction equal to -5 .
3. Write down an equation for the plane passing through the points $(0, 0, 1)$, $(1, 0, 2)$, and $(1, 1, 3)$.
4. Sketch the $z = 0$, $z = 1$, and $z = -1$ contours of the function $f(x, y) = x^2 - y^2$. Label these contours on your sketch. State what types of curves these contours are.
5. Does the following function have a limit at $(x, y) = (0, 0)$? Give a detailed reason why or why not.

$$f(x, y) = \frac{x^2 - y^2}{x + y}.$$

6. Does the following function have a limit at $(x, y) = (0, 0)$? Give a detailed reason why or why not.

$$f(x, y) = \frac{x^2 + y^2}{x^2 - y^2}.$$

7. Write down an equation of any function whose level surfaces are concentric circular cylinders with axis equal to the x -axis.