Classroom Voting Questions: Multivariable Calculus

12.1 Functions of Two Variables

1. A function \( f(x, y) \) can be an increasing function of \( x \) with \( y \) held fixed, and be a decreasing function of \( y \) with \( x \) held fixed.

   (a) True, and I am very confident
   (b) True, but I am not very confident
   (c) False, but I am not very confident
   (d) False, and I am very confident

2. You awaken one morning to find that you have been transferred onto a grid which is set up like a standard right-hand coordinate system. You are at the point \((-1, 3, -3)\), standing upright, and facing the \(xz\)-plane. You walk 2 units forward, turn left, and walk for another 2 units. What is your final position?

   (a) \((-1,1,-1)\)
   (b) \((-3,1,-3)\)
   (c) \((-3,5,-3)\)
   (d) \((1,1,-3)\)

3. Starting at the origin, if you move 3 units in the positive \(y\)-direction, 4 units in the negative \(x\)-direction, and 2 units in the positive \(z\)-direction, you are at:

   (a) \((3,4,2)\)
   (b) \((3,-4,2)\)
   (c) \((4,3,2)\)
   (d) \((-4,3,2)\)

4. Which of the following points lies closest to the \(xy\)-plane?

   (a) \((3,0,3)\)
   (b) \((0,4,2)\)
   (c) \((2,4,1)\)
5. Which of the following points lies closest to the origin?

   (a) (3,0,3)
   (b) (0,4,2)
   (c) (2,4,1)
   (d) (2,3,4)

6. Which of the following points lies closest to the y-axis?

   (a) (3,0,3)
   (b) (0,4,2)
   (c) (2,4,1)
   (d) (2,3,4)

7. The point (2,1,3) is closest to:

   (a) the xy plane
   (b) the xz plane
   (c) the yz plane
   (d) the plane z=6

8. Which of the following points lies closest to the point (1,2,3)?

   (a) (3,0,3)
   (b) (0,4,2)
   (c) (2,4,1)
   (d) (2,3,4)

9. Sphere A is centered at the origin and the point (0,0,3) lies on it. Sphere B is given by the equation \( x^2 + y^2 + z^2 = 3 \). Which of the following is true?

   (a) A encloses B
   (b) A and B are equal
   (c) B encloses A
10. The points (1, 0, 1) and (0, -1, 1) are the same distance from the origin.
   (a) True, and I am very confident
   (b) True, but I am not very confident
   (c) False, but I am not very confident
   (d) False, and I am very confident

11. The point (2, -1, 3) lies on the graph of the sphere \((x - 2)^2 + (y + 1)^2 + (z - 3)^2 = 25\). 
   (a) True, and I am very confident
   (b) True, but I am not very confident
   (c) False, but I am not very confident
   (d) False, and I am very confident

12. In a table of values for a linear function, the columns must have the same slope as the rows.
   (a) True, and I am very confident
   (b) True, but I am not very confident
   (c) False, but I am not very confident
   (d) False, and I am very confident

13. The set of all points whose distance from the z-axis is 4 is the:
   (a) sphere of radius 4 centered on the z-axis
   (b) line parallel to the z-axis 4 units away from the origin
   (c) cylinder of radius 4 centered on the z-axis
   (d) plane \(z = 4\)