

Math 241, Exam 2, Fall, 2020

Write everything on the blank paper that you brought. There should be nothing on your desk except this exam, the blank paper that you brought, and a pen or pencil. When you are finished, send a picture of your solutions to

kustin@math.sc.edu

You should KEEP this piece of paper. If possible: put the problems in order before you take your picture. (Use as much paper as necessary).

The exam is worth 50 points. Each problem is worth 10 points. Please make your work coherent, complete, and correct. Please CIRCLE your answer. Please **CHECK** your answer whenever possible.

- (1) Find the point on the plane $x + 2y + 3z = 4$ which is closest to the point $(2, 3, 4)$.
- (2) Graph, describe, and name the surface $x^2 + y^2 = z^2$ in three space.
- (3) An object moves in three space. At time t , the position vector of the object is $\vec{r}(t)$. Suppose $\vec{r}''(t) = \sin(2t)\vec{i} + e^{2t}\vec{j}$, $\vec{r}(0) = \vec{i} + 2\vec{j}$, and $\vec{r}'(0) = 3\vec{i} + 4\vec{j}$. Find $\vec{r}(t)$.
- (4) Suppose $z = \sqrt{x \sin(xy)}$. Find $\frac{\partial z}{\partial x}$ and $\frac{\partial z}{\partial y}$.
- (5) Find the equation of the plane which contains the points $P_1 = (6, 3, -1)$, $P_2 = (1, -4, 1)$, and $P_3 = (2, 3, 4)$. **Check your answer. Make sure it is correct.**