

Math 241, Exam 1, 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 an equation for the plane through the points  $P_1 = (2, 3, 4)$ ,  $P_2 = (3, 4, 5)$ , and  $P_3 = (2, -1, 8)$ . **Check your answer. Make sure it is correct.**
- (2) Express  $\vec{v} = -\vec{i} + 3\vec{j}$  as the sum of a vector parallel to  $\vec{b} = 3\vec{i} - 4\vec{j}$  and a vector perpendicular to  $\vec{b}$ . **Check your answer. Make sure it is correct.**
- (3) Let  $f(x, y) = 2x^2 \sin(2x + 3y)$ . Find  $\frac{\partial f}{\partial x}$  and  $\frac{\partial f}{\partial y}$ .
- (4) Find  $\lim_{\substack{(x,y) \rightarrow (0,0) \\ \text{along } y=x}} \frac{x^2}{x^2+y^2}$ .
- (5) Consider the set of all points in 3-space which satisfy both equations  $x^2 + y^2 + z^2 = 4$  and  $x = 1$ . Describe, name, and draw this set.