

Math 241, Exam 1, Spring, 2022

You should KEEP this piece of paper. Write everything on the **blank paper provided**. Return the problems **in order** (use as much paper as necessary), use **only one side** of each piece of paper. Number your pages and write your name on each page. Take a picture of your exam (for your records) just before you turn the exam in. I will e-mail your grade and my comments to you. I will keep your exam. **Fold your exam in half** before you turn it in.

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

The solutions will be posted later today.

No Calculators, Cell phones, computers, notes, etc.

- (1) Find a system of parametric equations for the line through the points $P_1 = (1, 2, 3)$ and $P_2 = (-1, 4, 9)$. **Check your answer. Make sure it is correct.**
- (2) Find an equation for the plane through the points $P_1 = (1, 2, 3)$, $P_2 = (6, 5, 4)$, and $P_3 = (-1, 0, 1)$. **Check your answer. Make sure it is correct.**
- (3) Express $\vec{v} = 3\vec{i} + 5\vec{j}$ as the sum of a vector parallel to $\vec{b} = 2\vec{i} + 3\vec{j}$ and a vector orthogonal to \vec{b} . **Check your answer. Make sure it is correct.**
- (4) Put $2x^2 + 3y^2 + 4z^2 - 12x - 24y - 40z + 158 = 0$ in the form

$$A(x - x_0)^2 + B(y - y_0)^2 + C(z - z_0)^2 = D,$$

where $x_0, y_0, z_0, A, B, C,$ and D are numbers.

- (5) Name, describe, and graph the set of all points in three-space which satisfy the equation $z = x^2$