

Name:

# Math 115 Exam 1

September 29, 2022

1. WRITE YOUR NAME ON THIS TEST!
2. Except where indicated, merely finding the answer to a problem is not enough to receive full credit; you must show how you arrived at that answer.
3. Unless indicated, DO NOT convert irrational numbers such as  $\sqrt{3}$  or  $\pi$  into decimal approximations; just leave them as they are.
4. If you have a question, raise your hand or come up and ask me.

1) a) The plane  $5x - 2y + 3z = 8$  intersects the  $yz$ -plane in a line. Plot the  $y$ -intercept of this line.

b) The base of a right triangle in the  $yz$ -plane extends from  $(0, -4, 0)$  to  $(0, 0, 0)$ . If the hypotenuse of the triangle is 5 units long and the third vertex is not on the  $z$ -axis, plot the third vertex of the triangle.

c) Plot the point  $(6, -4, 3)$  in  $xyz$ -space.

2) For the function  $z = f(x, y) = \ln\left(\frac{x^2}{4} + \frac{y^2}{9} - 1\right)$ ,

- a) Is  $(5, 3)$  in the domain of  $f$ ?
- b) Is  $(-1, 1)$  in the domain of  $f$ ?
- c) Sketch the domain of  $f$ .

**3)** Determine the range of  $y = h(x) = \frac{2x - 1}{3x + 4}$ , with calculations to support your assertion.

4) Find the equation of the plane through the points  $(-1, 0, 1)$ ,  $(0, 3, 2)$ , and  $(8, 3, 6)$ .

5) Let  $g(x) = \frac{1}{\sqrt{9-x^3}}$ .

a) Find the slope of the secant line from the point  $(2, 1)$  to the point  $(2+h, g(2+h))$ .

b) Determine the equation of the tangent line to the graph of  $g$  at the point  $(2, 1)$ .