

**Homework Set 2**

DUE: SEP 16, 2019 (AT THE BEGINNING OF CLASS)

**To be handed in:***Please write your solution to Problems 1, 2, and 3 on a single sheet of paper!*

1. Write the equation of the plane in  $\mathbb{R}^3$  that passes through the points  $P = (1, 2, 3)$ ,  $Q = (4, 5, 6)$ , and  $R = (-1, 0, -2)$ .
  
2. Consider the surface in  $\mathbb{R}^3$  defined by the equation  $x^2 + 4y^2 = z^2$ .
  - a) Describe the cross-sections with the  $xy$ -planes, that is, planes where  $z = z_0$ .
  - b) Describe the cross-sections with the  $xz$ -planes, that is, planes where  $y = y_0$ .
  - c) Describe the cross-sections with the  $yz$ -planes, that is, planes where  $x = x_0$ .
  - d) Sketch a picture of the surface and determine what type of quadric it is (classifying it as an ellipsoid, or paraboloid, or hyperboloid, or cone, etc.)
  
3. Consider the surface in  $\mathbb{R}^3$  defined by the equation  $x^2 + 4y^2 + z^2 = 1$ .
  - a) Describe the cross-sections with the  $xy$ -planes, that is, planes where  $z = z_0$ .
  - b) Describe the cross-sections with the  $xz$ -planes, that is, planes where  $y = y_0$ .
  - c) Describe the cross-sections with the  $yz$ -planes, that is, planes where  $x = x_0$ .
  - d) Sketch a picture of the surface and determine what type of quadric it is (classifying it as an ellipsoid, or paraboloid, or hyperboloid, or cone, etc.)

NOT to be handed in (but recommended for you to practice with):

4. Textbook (5th edition) Section 11.5, Exercises 15-19, 47-50
  
5. Textbook (5th edition) Section 11.6, Exercises 1-6, 9-14