

## Math 153A : Calculus and Analytic Geometry III Polar/Spherical/Cylindrical Coordinates exercises

### Polar Coordinates

1. Convert the point  $(3, \pi/4)$  from polar to cartesian coordinates.
2. Convert the point  $(2, 4)$  from cartesian to polar coordinates three different ways.
3. Express the equation of the circle  $x^2 + y^2 = 4$  in polar coordinates.
4. Express the equation of the line  $y - 2x = 5$  in polar coordinates.
5. Sketch a graph of the lemacon  $r = 4 + 2 \cos \theta$ .

### Cylindrical Coordinates

1. Convert the point  $(1, 1, 4)$  from cartesian to cylindrical coordinates in 3 ways.
2. Convert the point  $(-3, 2\pi/3, 5)$  from cylindrical to cartesian coordinates.
3. Give the equation of the cone  $z^2 = x^2 + y^2$  in cylindrical coordinates.
4. What does the graph of  $r = 5$  look like in cylindrical coords?

### Spherical Coordinates

1. Convert the point  $(1, 1, 4)$  from cartesian to spherical coords in 2 ways.
2. Convert the point  $(-3, 2\pi/3, \pi/3)$  from spherical to cartesian coords.
3. Give the equation of the come  $z^2 = x^2 + y^2$  in spherical coordinates.
4. What does the graph of  $\theta = \pi/4$  look like? What is the graph of  $r = 5$  in spherical coords?