Calculus III
Homework on Lecture 5

1. Find polar equations of the line given below.
   (a) The line $x + y = 1$.
   (b) The line $x + \sqrt{3}y = 2$.
   (c) The line passing through $(3, 5)$ and $(5, 7)$.
   (d) The line passing through $(2, 3)$ and $(-3, -2)$.
2.
3. Find polar equations of the circle given below.
   (a) The circle given by $(x - 1)^2 + y^2 = 1$.
   (b) The circle given by $x^2 + x + y^2 = 1$.
   (c) The circle with center $(1, 2)$ and radius 3.
   (d) The circle with center $(2, 3)$ and radius 4.
4. Find an equation of the plane in cylindrical coordinates.
   (a) The plane given by $x + y + z = 1$.
   (b) The plane given by $2x + 3y - 5z = 0$.
   (c) The plane passing through $(-1, 1, 1)$, $(1, 1, -1)$ and $(1, -1, 1)$.
   (d) The plane passing through $(2, 3, 5)$, $(3, 5, 2)$ and $(5, 2, 3)$.
5. Find an equation of the sphere in cylindrical coordinates.
   (a) The unit sphere.
   (b) The sphere with equation $x^2 + x + y^2 + 2y + z^2 + 3z = 0$.
   (c) The sphere with center $(1, 2, 3)$ and radius 5.
6. Find an equation of the plane in spherical coordinates.
   (a) The plane given by $x + y + z = 1$.
   (b) The plane given by $2x + 3y - 5z = 0$.
   (c) The plane passing through $(-1, 1, 1)$, $(1, 1, -1)$ and $(1, -1, 1)$.
   (d) The plane passing through $(2, 3, 5)$, $(3, 5, 2)$ and $(5, 2, 3)$.
7. Find an equation of the sphere in spherical coordinates.
   (a) The unit sphere.
   (b) The sphere with equation $x^2 + x + y^2 + 2y + z^2 + 3z = 0$.
   (c) The sphere with center $(1, 2, 3)$ and radius 5.