Class 2, Practice Problems

Mutivariable Calculus

January 13, 2020

11.1 Three dimensional space

1. Let $P_1 = (2, 4, 5)$ and $P_2 = (-6, 2, 3)$.

   a) Find the distance from the point P_1 to the point P_2.

   b) Find the midpoint between P_1 and P_2.

2. Sketch the graph of the following equation in 3-dimensional space.

   a) $y = x$.

   b) $x^2 + y^2 = 1$.

   c) $y = z^2$.

3. Let $P_1 = (1, -2, 2)$ and $P_2 = (3, 4, -12)$ as endpoints of diameter of the sphere.

   a) Find the center and radius of the sphere.

   b) Find the equation of the sphere.

11.2 Vectors

1. Find the vector $\mathbf{v}$ for which the initial point is $(4, 1, -3)$ and the terminal point is $(5, -2, 9)$.

2. Let $\mathbf{u} = \mathbf{i} - 3\mathbf{j} + 2\mathbf{k}$ and $\mathbf{v} = \mathbf{i} + \mathbf{j}$.

   a) Find the norm of $\mathbf{u}$ and $\mathbf{v}$.

   b) Find the unit vector of $\mathbf{u} + \mathbf{v}$.

   c) Find the vector with length 5 and has opposite direction to the vector $\mathbf{u}$.