Homework

1. A company's profit function is

$$P(x) = -2x^2 + 12x - 5,$$

where x is units produced. Find the production level that maximizes profit.

2. Let $\mathbf{u} = (1, 2, 3)$ and $\mathbf{v} = (4, -1, 2)$. Compute:

   (a) $\mathbf{u} + \mathbf{v}$

   (b) $2\mathbf{u} - 3\mathbf{v}$

   (c) $\mathbf{u} \cdot \mathbf{v}$

3. Find the length (norm) of

$$\mathbf{w} = (2, -1, 2, 2)$$

and normalize it.

4. Let $\mathbf{a} = (1, 0, -1)$ and $\mathbf{b} = (2, 3, 1)$. Compute the angle between $\mathbf{a}$ and $\mathbf{b}$.

5. Find a linear function whose graph is the plane intersects the xy-plane along the line $y = 2x + 2$ and contains the point $(1, 2, 2)$

6. Determine if z is a funciton of x and y

   (a) $6x - 4y + 2z = 10$

   (b) $x^2 + y^2 + z^2 = 100$

   (c) $3x^2 - 5y^2 + 5z = 10 + x + y$

7. Show that the following limit does not exist

$$\lim_{(x,y)\to(0,0)} \frac{x + y^2}{2x + y}$$

8. Find the following limit

$$\lim_{(x,y)\to(0,0)} \frac{x + y}{\sin y + 2}$$