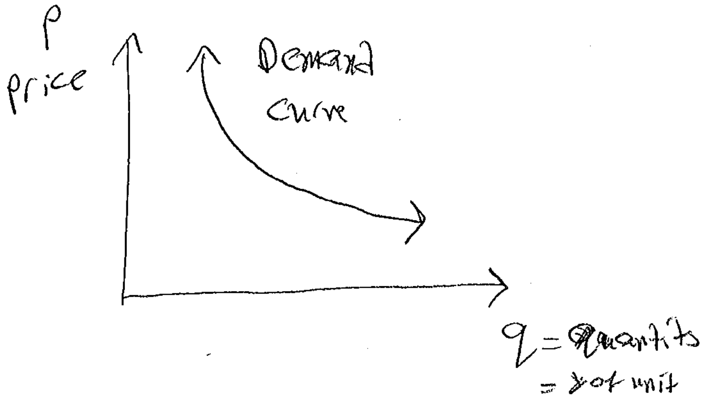
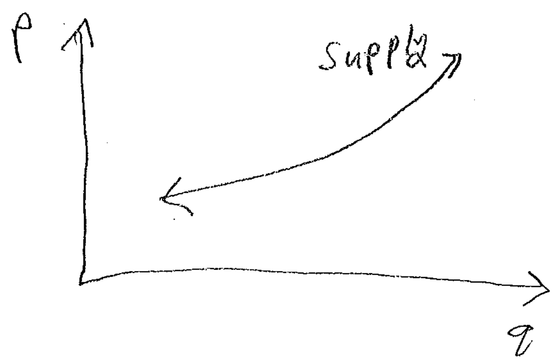
§ 3.2 - Applications and Linear functions





Example 1:

Suppose the demand per week is 100 units when the price is 60 and 200 units when the price is 50 BD. Determine the demand function assuming it is a linear.

$(\underset{x_1}{100}, \underset{y_1}{60})$ and $(\underset{x_1}{200}, \underset{y_1}{50})$

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{50 - 60}{200 - 100} = \frac{-10}{100} = \frac{-1}{10}.$$

$$y - y_1 = m(x - x_1) \rightarrow y - 60 = -\frac{1}{10}(x - 100) \rightarrow 10y + x + 500 = 0$$

Exercise 1: (old Exam Question).

Example 2: ~~If~~ Determine $f(x)$ ~~if it's~~ a linear function with the following

(1) slope $= 2$ and $f(2) = 7$

(2) $f(1) = 2$ and $f(2) = 6$

Exercise 3: (cost equation)

Suppose the cost to produce 10 units of a product is 40 BD and the cost ~~of~~ 20 units is 70 BD. If the cost c, is linearly related to output q, find a linear equation relating c and q. Find the cost to produce 35 units.

Example 3: (Inverse of Linear function)

(a) Does the linear function $f(x) = mx + b$ $(m \neq 0)$ have an inverse? why? what is the name of the test?

(b) Find the inverse function. and deduce that $f^{-1}(x)$ is again a linear function

Solution:-

(b)

$$y = mx + b$$

$$x = my + b$$

$$x - b = my$$

$$\frac{1}{m}x - \frac{b}{m} = y \longrightarrow f^{-1}(x) = \frac{1}{m}x - \frac{b}{m}$$ which is again a linear function with slope $\frac{1}{m}$ & y-intercept is $(0, -\frac{b}{m})$.