Application Problems

Ex: (Average Cost) A company manufacturing surfboards has fixed costs of $300 per day and total cost of $5,100 per day at a daily output of 20 boards.

A) Assuming that the total cost per day, $C(x)$, is linearly related to the total output per day, $x$, write an equation for the cost function.

$$C = mx + b$$

$$C(0) = 300, \quad C(20) = 5100$$

$$m = \frac{5100 - 300}{20 - 0} = \frac{4800}{20} = 240$$

$$b = 300$$

$$C = 240x + 300$$

B) The average cost per board for an output of $x$ boards is given by $\overline{C}(x) = \frac{C(x)}{x}$, Find $\overline{C}(x)$.

$$\overline{C}(x) = \frac{C(x)}{x} = \frac{240x + 300}{x}$$

VA: $x = 0$  \quad HA: $y = 240$
C) Sketch a graph of $\overline{C}(x)$ for $1 \leq x \leq 30$.

D) What does the average cost per board tend to as production increase?

\[ x \text{ increase } (x \to \infty) \]

\[ 240 \]
Section 2-5: Exponential Functions

(a calculator is needed for some hw problems in this section and 2-6)

\( y = x^2 \) is a quadratic function;

If we switch \( x \) and 2, we get \( y = 2^x \) called exponential function of base 2.

**Definition:** Exponential function is the form: \( y = b^x \), where \( b \) is called ‘base’, \( b > 0 \) and \( b \neq 1 \).

See the graphs when the base is 2 and 1/2: