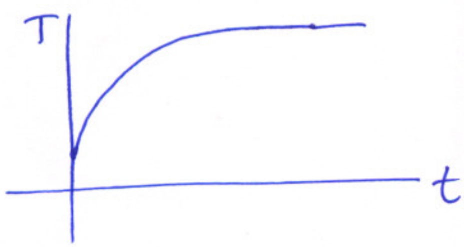
MA 160
Section 1.1

1. Using "common sense" language, define the following

Line	Curve	Continuous	Cost
Point	Maximum	Change	Chain

A **function** is a rule that assigns to each input exactly one output.

2. When you turn on a hot-water faucet, the temperature T of the water depends on how long the water has been running. Draw a rough graph of T as a function of the time t that has elapsed since the faucet was turned on. Include axes labeled with the variables T and t as part of your graph.



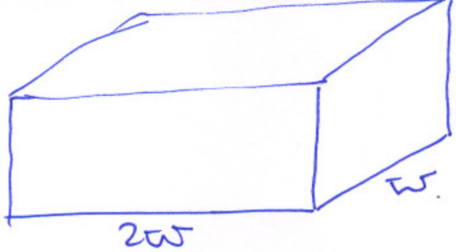
The **domain** of a function is the set of all allowable inputs. The **range** is the set of all possible output values.

3. A café sells its basic coffee in three different cup sizes: 8, 10, and 14 ounces. They charge \$0.22 per ounce for the drinks.
   a) If the function p is defined so that $p(v)$ is the price of v ounces of coffee, find and interpret the value of $p(10)$. A 10 oz Cup of coffee costs \$2.20
   b) What are the domain and range of p?

Domain : {8, 10, 14}

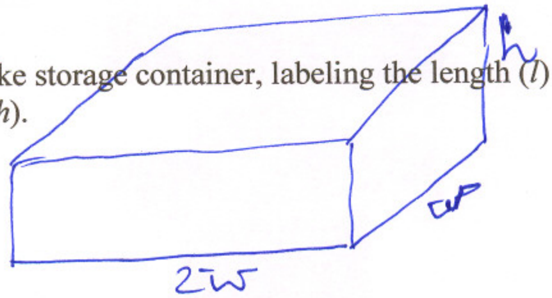
Range {\$1.76, \$2.20, \$3.08}

$$\begin{array}{r} ^{1}22 \\ 8 \\ \hline 176 \end{array} \qquad \begin{array}{r} 22 \\ \times 10 \\ \hline 220 \end{array} \qquad \begin{array}{r} 22 \\ 14 \\ \hline 88 \\ 22 \\ \hline 308 \end{array}$$



4. A rectangular storage container has an open top. The length of its base is twice its width. Material for the base costs \$10 per square meter; material for the sides costs \$6 per square meter.

   a) Draw the box-like storage container, labeling the length (l) and width (w) of the base, and the height (h).



   b) Express the area of the base in terms of the width of the container.

$$A = (2w)(w) = 2w^2$$

   c) Express the cost of material for the base in terms of the width of the container.

$$\text{Cost} = (10)(2w^2) = 20w^2$$

   d) Express the area of the sides in terms of the width and the height.

$$A = wh + wh + 2wh + 2wh = 6wh$$

   e) Express the cost of material for the sides in terms of the width and the height.

$$\text{Cost} = 6(6wh) = 36wh$$

   f) Express the total cost of materials in terms of the width and the height.

$$\text{Total cost} = 20w^2 + 36wh$$

   g) The volume of the rectangular container is 10 m^3. Using the fact that volume = width · length · height, express the total cost of materials in terms of the width only.

$$V = Lwh = (2w)(w)(h) = 2w^2h$$

$$10 = 2w^2h$$

$$5 = w^2h$$

$$h = \frac{5}{w^2}$$

$$\text{Total cost} = 20w^2 + 36wh = 20w^2 + 36w\left(\frac{5}{w^2}\right) = \boxed{20w^2 + \frac{180}{w}}$$

5. Let $f(x) = x^2 - 1$. What is *f(2)? f(-2)? f(☺)? f(h)? f(1+h)?*

$$f(2) = 4 - 1 = 3$$

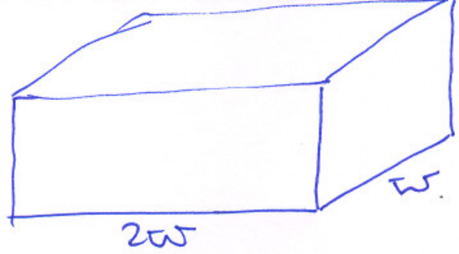
$$f(-2) = 4 - 1 = 3$$

$$f(☺) = ☺^2 - 1$$

$$f(h) = h^2 - 1$$

$$f(1+h) = (1+h)^2 - 1 = 1 + 2h + h^2 - 1 = \boxed{2h + h^2}$$

Additional vocabulary: continuous function, discrete function, vertical line test



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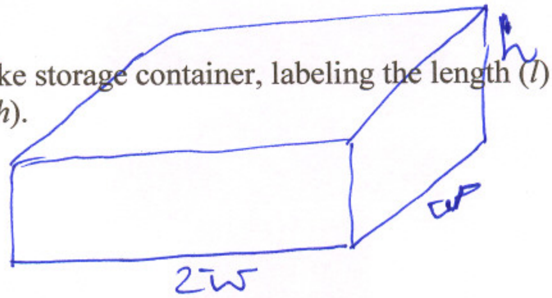

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