Sec 2.1 Input and Output

Input – the independent variable, x, that you start with in a situation

Output – the dependent variable, y, that you get out of a situation

Ex. Using the fact that one gallon of paint covers 250 square feet, evaluate the expression f(20,000).

$f(x) = \frac{x}{250}$ $\quad f(20{,}000) = \frac{20{,}000}{250}$

$f(20{,}000) = 80$ gallons

Ex. Using the formula for the area of a circle, evaluate q(10) and q(20). What do your results tell you about the circles?

$q(r) = \pi r^2$

$q(10) = \pi(10)^2$ $\quad q(20) = \pi(20)^2$

$= 100\pi$ $\quad = 400\pi$

$q(10) = 314.16\ u^2$ $\quad q(20) = 1256.64$

The area of a circle radius of 10 has an area of 314cm^2 and one with a radius of 20 has an area of $1257\ \text{cm}^2$.

Let $g(x) = \dfrac{x^2+1}{5+x}$. Evaluate the following expressions:

a. g(3)

$\frac{3^2+1}{5+3}$

$\frac{10}{8}$

1.25

b. g(-1)

$\frac{(-1)^2+1}{5+-1}$

$\frac{2}{4}$

$\frac{1}{2}$

c. g(a)

$\frac{a^2+1}{5+a}$

Ex. Let $h(x) = x^2 - 3x + 5$. Evaluate and simplify the following expressions.

(a) $h(2)$

$2^2-3(2)+5$

$4-6+5$

$-2+5$

3

(b) $h(a-2)$

$(a-2)^2-3(a-2)+5$

$a^2-4a+4-3a+6+5$

$a^2-7a+15$

(c) $h(a)-2$

$a^2-3a+5-2$

a^2-3a+3

(d) $h(a)-h(2)$

$a^2-3a+5-[2^2-3\cdot 2+5]$

$a^2-3a+5-[4-6+5]$

$a^2-3a+5-3$

a^2-3a+2

**When you know the output, you must work backwards to find the input instead!

Ex. Given T= ¼ R + 40, when the temperature is 76 degrees, what is the rate of the cricket chirps?

$76 = \frac{1}{4}R + 40$

$36 = \frac{1}{4}R$

$144 = R$

144 chirps/min

Ex. Suppose $f(x) = \frac{1}{\sqrt{x-4}}$. Find an x value that results in f(x) = 2. Is there an x value that results in f(x) = -2? Explain.

$2 = \frac{1}{\sqrt{x-4}}$

$2\sqrt{x-4} = 1$

$4(x-4) = 1$

$4x - 16 = 1$

$4x = 17$

$x = \frac{17}{4}$

No, $\sqrt{x}$ always yields a positive value, so f(x) cannot be negative

Ex. Let A = q(r) be the area of a circle of radius, r. What is the radius of the circle whose area is 100 cm^2 square?

$q(r) = \pi r^2$

$\frac{100}{\pi} = \frac{\pi r^2}{\pi}$

$\sqrt{\frac{100}{\pi}} = \sqrt{r^2}$

$\frac{10}{\sqrt{\pi}} = r$

$r = 5.64$ cm

**Sometimes inputs and outputs are used within tables and graphs instead.

Ex. The table shows the revenue, $R = f(t)$, received, by the National Football League, NFL, from network TV as a function of the year, t, since 1975. (a) Evaluate and interpret f(25). (b). Solve and interpret f(t) = 1159.

Year, t (since 1975)	0	5	10	15	20	25	30
Revenue, R (million $)	201	364	651	1075	1159	2200	2200

f(25) = 2200

In the year 2009 the revenue was $2,200,000,000.

f(20) = 1159

or

t = 20

In the year 1995, the revenue was $1,159,000,000

Ex. In groups, open your book to page 71. Look through and answer Example 9. Explain how you would arrive at your answers.

a.) v(5) = 0 mph

b.) v(24) = -40 mph

c.) v(7) - v(6)

35 - 0 = 35 mph

d.) v(-3) = Not defined

not on graph

e.) v(t) = 15 t = .75, 3.75, 6.5, 15.5 min

f.) v(t) = -20 t = 19.5, 29 min

g.) v(t) = v(7) t = 7 and 15 min

v(t) = 27 (Same height on y-axis)

HW: pg 72-74, #1-12 (evens), 15-33 (m/3), 35