

SOLUTIONS, Sections 1.1 - 1.4

1. 1.1, #35

(a) Yes, this is a function. For every input, there is exactly one output.

(b) $4s + 1 \geq 0$

$$4s \geq -1$$

$$s \geq \frac{-1}{4}$$

(c) In context of the situation, the domain is $s \geq 0$.

2. 1.1, #62

(a) $S(0) = -4.9(0)^2 + 98(0) + 2 = 2$
2 meters.

(b) $S(9) = 487.1$
 $S(10) = 492$
 $S(11) = 487.1$

(c) Maximum height occurs around 10 seconds.

3. 1.2, #27

(a) 1994 corresponds to $x = 4$ since $1994 - 1990 = 4$. 1998 corresponds to $x = 8$.

(b) $y = -112(8)^2 - 107(8) + 15,056 = 7,032$ welfare cases.

(c) $y = -112(5)^2 - 107(5) + 15,056 = 11,721$ welfare cases.

4. 1.3, #35

(a) Set $p = 0$, solve for x .

$$30p - 19x = 30$$

$$30(0) - 19x = 30$$

$$-19x = 30$$

$$x = \frac{-30}{19}$$

(b) To find the p -intercept, set $x = 0$, and solve for p .

$$30p - 19(0) = 30$$

$$30p = 30$$

$$p = 1$$

In 1990, 1% of students used marijuana.

(c) 1990 corresponds to $x = 0$

(d) Extra problem on website:

i. 1978 corresponds to $x = -12$. When plugging this into the equation $30p - 19x = 30$, we get the following:

$$30p - 19(-12) = 30$$

$$30p + 228 = 30$$

$$30p = -198$$

$p = -6.6\%$. So the answer is a negative percentage, which does not make much sense.

ii. We need to solve for x after plugging $p = 100$ into the equation $30p - 19x = 30$. This leads to the following work:

$$30(100) - 19x = 30$$

$$3000 - 19x = 30$$

$$-19x = -2970$$

So, x is about 156. This means that in the year 2146, all seniors would be using the drug (seems unrealistic).

iii. A linear model may only be a good predictor over a short time interval.

5. 1.3, #40

(a) $m = -.7069$, the slope is negative.

(b) The percentage is decreasing.

6. 1.3, #52

(a) $m = \frac{68.5 - 18.1}{1990 - 1890} = \frac{50.4}{100} = .504$ billion.

(b) The number of men in the workforce increased by 504,000 each year.

7. 1.3, #56

(a) $m = 98$

(b) \$98 per unit.

(c) Making an additional tv set each month costs \$98.

8. 1.4, #50

(a) At $t = 0$, $y = 860,000$.

(b) Using the ordered pairs $(0, 860,000)$ and $(25, 0)$, we have

$$m = \frac{0 - 860,000}{25 - 0} = -34,400$$

The equation of the line is $y = -34,400t + 860,000$.

9. 1.4, #51

$$m = \frac{32.1 - 32.7}{26 - 6} = -.03$$

Plugging the slope into the point-slope form of a line, we have:

$$y - 32.7 = -.03(x - 6).$$

After simplifying, we get $y = -.03x + 32.88$.

10. 1.4, #57

(a) Average rate of change = $\frac{f(2001) - f(1996)}{2001 - 1996} = 3.42$ billion dollars/year

(b) 3.42

(c) Not constant

(d) Cannot be modeled exactly.