

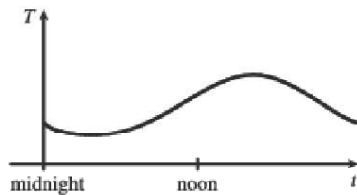
Assignment #1.1c Homework Solutions

Pages 21-23 #9-11, 13-16, 23, 25, 36, 38, 46, 48, 50-53, 63-67

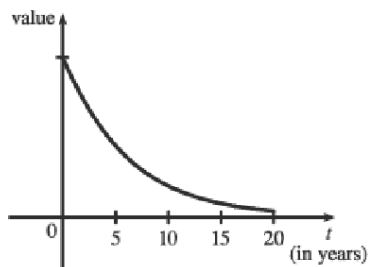
9. The person's weight increased to about 160 pounds at age 20 and stayed fairly steady for 10 years. The person's weight dropped to about 120 pounds for the next 5 years, then increased rapidly to about 170 pounds. The next 30 years saw a gradual increase to 190 pounds. Possible reasons for the drop in weight at 30 years of age: diet, exercise, health problems.
10. The salesman travels away from home from 8 to 9 AM and is then stationary until 10:00. The salesman travels farther away from 10 until noon. There is no change in his distance from home until 1:00, at which time the distance from home decreases until 3:00. Then the distance starts increasing again, reaching the maximum distance away from home at 5:00. There is no change from 5 until 6, and then the distance decreases rapidly until 7:00 PM, at which time the salesman reaches home.
11. The water will cool down almost to freezing as the ice melts. Then, when the ice has melted, the water will slowly warm up to room temperature.



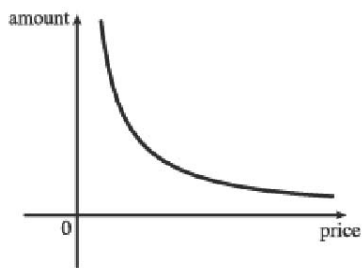
13. Of course, this graph depends strongly on the geographical location!



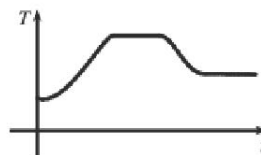
14. The value of the car decreases fairly rapidly initially, then somewhat less rapidly.



15. As the price increases, the amount sold decreases.



16. The temperature of the pie would increase rapidly, level off to oven temperature, decrease rapidly, and then level off to room temperature.



23. $f(x) = 4 + 3x - x^2$

$$\begin{aligned} \frac{f(3+h) - f(3)}{h} &= \frac{[4 + 3(3+h) - \overset{9+6h+h^2}{(3+h)^2}] - [4 + 3(3) - (3)^2]}{h} \\ &= \frac{4 + 9 + 3h - 9 - 6h - h^2 - 4}{h} \\ &= \frac{-3h - h^2}{h} \\ &= -3 - h \end{aligned}$$

25. $f(x) = \frac{1}{x}$

$$\begin{aligned} \frac{f(x) - f(a)}{x - a} &= \frac{\frac{1}{x} - \frac{1}{a}}{x - a} = \frac{\frac{a-x}{ax}}{x-a} \\ &= \frac{a-x}{ax} \cdot \frac{1}{x-a} \\ &= \frac{a-x}{ax} \cdot \frac{1}{-1(a-x)} \\ &= \frac{-1}{ax} \end{aligned}$$

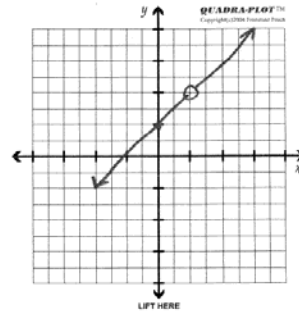
36. $H(t) = \frac{4-t^2}{2-t}$

$$H(t) = \frac{(2+t)(2-t)}{2-t}$$

so for $t \neq 2$ $H(t) = 2+t$

Domain: \mathbb{R} except $t=2$

Graph is $y=2+t$ except a hole at $(2,4)$

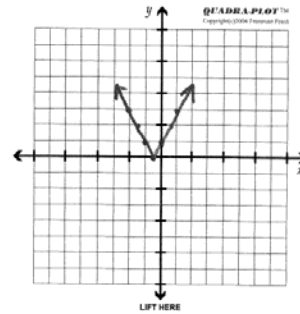


38. $F(x) = |2x+1|$

$$|2x+1| = \begin{cases} 2x+1 & \text{if } 2x+1 \geq 0 \\ -(2x+1) & \text{if } 2x+1 < 0 \end{cases}$$

$$|2x+1| = \begin{cases} 2x+1 & \text{if } x \geq -\frac{1}{2} \\ -2x-1 & \text{if } x < -\frac{1}{2} \end{cases}$$

Domain: \mathbb{R}



46. $(-5, 10)$ $(7, -10)$

$$m = \frac{-10-10}{7+5} = \frac{-20}{12} = -\frac{5}{3}$$

$$y-10 = -\frac{5}{3}(x+5)$$

$$y = -\frac{5}{3}x + \frac{5}{3}$$

Domain: $-5 \leq x \leq 7$

since line SEGMENT

$$48. \quad x^2 + (y-2)^2 = 4$$

$$(y-2)^2 = -x^2 + 4$$

$$y-2 = \pm \sqrt{-x^2+4}$$

$$y = 2 \pm \sqrt{-x^2+4}$$

$$\text{top half of circle} \Rightarrow y = 2 + \sqrt{-x^2+4}$$

$$-x^2+4 \geq 0$$

$$x^2-4 \leq 0$$

$$(x+2)(x-2) \leq 0 \quad \text{Domain: } [-2, 2]$$

50. PIECEWISE FUNCTION

$$-4 \leq x \leq -2: \quad m = -\frac{3}{2} \quad \text{pt } (-2, 0)$$

$$y-0 = -\frac{3}{2}(x+2)$$

$$y = -\frac{3}{2}x - 3$$

$$-2 < x < 2: \quad \text{top half of circle } x^2 + y^2 = 4$$

$$y^2 = -x^2 + 4$$

$$y = \pm \sqrt{-x^2+4}$$

$$\text{since top half } y = \sqrt{-x^2+4}$$

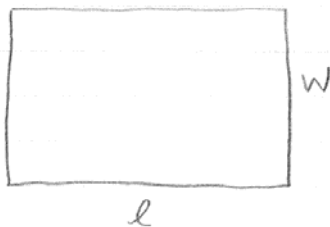
$$2 \leq x \leq 4: \quad m = \frac{3}{2} \quad \text{pt } (2, 0)$$

$$y-0 = \frac{3}{2}(x-2)$$

$$y = \frac{3}{2}x - 3$$

$$y = \begin{cases} -\frac{3}{2}x - 3 & \text{if } -4 \leq x \leq -2 \\ \sqrt{-x^2+4} & \text{if } -2 < x < 2 \\ \frac{3}{2}x - 3 & \text{if } 2 \leq x \leq 4 \end{cases}$$

51.



$$2l + 2w = 20$$

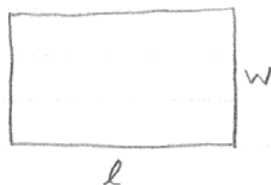
$$A = lw$$

$$2l = 20 - 2w$$

$$l = 10 - w$$

$$A = (10-w)w = 10w - w^2$$

52.



$$lw = 16 \quad 2l + 2w = p$$

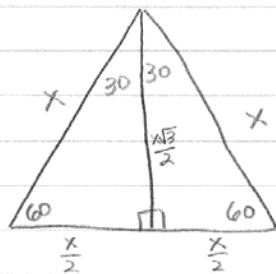
$$l = \frac{16}{w}$$

$$2\left(\frac{16}{w}\right) + 2w = p$$

$$p = \frac{32}{w} + 2w$$

Domain: $w > 0$

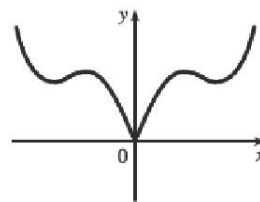
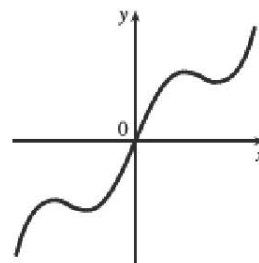
53.



$$A = \frac{1}{2}bh$$

$$A = \frac{1}{2}(x)\left(\frac{x\sqrt{3}}{2}\right)$$

$$A = \frac{x^2\sqrt{3}}{4}$$

Domain: $x > 0$ 63. (a) $(-5, 3)$ (reflects across y -axis)(b) $(-5, -3)$ (symmetric with respect to the origin)64. (a) If f is even, we get the rest of the graph by reflecting about the y -axis.(b) If f is odd, we get the rest of the graph by rotating 180° about the origin.

$$65. f(x) = \frac{x}{x^2+1}$$

$$f(-x) = \frac{-x}{(-x)^2+1} = \frac{-x}{x^2+1} = -\frac{x}{x^2+1} = -f(x)$$

thus $f(x)$ is odd

$$66. f(x) = \frac{x^2}{x^4+1}$$

$$f(-x) = \frac{(-x)^2}{(-x)^4+1} = \frac{x^2}{x^4+1} = f(x)$$

$\therefore f(x)$ is even

$$67. f(x) = \frac{x}{x+1}$$

$$f(-x) = \frac{-x}{-x+1}$$

since $f(-x) \neq f(x)$ and $f(-x) \neq -f(x)$
 $f(x)$ is neither even nor odd