

p 8

2. a. $f(-4) = -2$ $g(3) = 4$

b. $x = -2, 2$

c. $x = 4, x = -3$

d. $[0, \infty)$

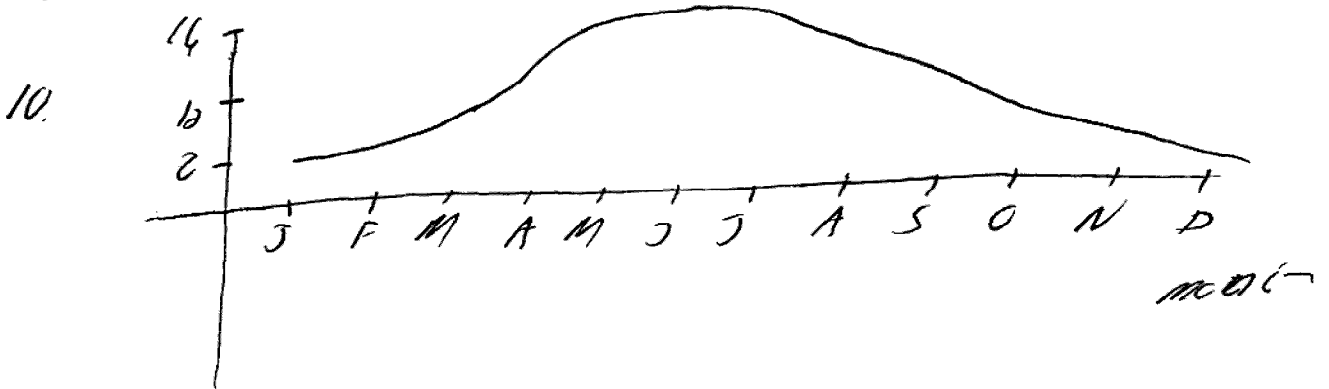
e. Domain: $[-4, 4]$ Range $[-2, 3]$

f. Domain $[-4, 3]$ Range $[3, 4]$

3. Not a function 4. Yes, domain $[-2, 2]$ Range $[-1, 2]$

5. Yes: Domain $[-3, 2]$ Range $[-3, -2) \cup [1, 3]$

6. NO



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

$f(2) = 12$ $f(-2) = 16$, $f(a) = 3a^2 - a + 2$,
 $f(-a) = 3a^2 + a + 2$, $f(a+1) = 3(a+1)^2 - (a+1) + 2$,

$2f(a) = 6a^2 - 2a + 4$, $f(2a) = 3(2a)^2 - 2a + 2$

$f(a^2) = 3a^4 - a^2 + 2$ $(f(a))^2 = (3a^2 - a + 2)^2$

$f(a+h) = 3(a+h)^2 - (a+h) + 2$

18.

$$F(r) = V(r+1) - V(r) =$$

$$\frac{4}{3}\pi(r+1)^3 - \frac{4}{3}\pi r^3$$

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

$$\frac{f(3+h) - f(3)}{h} = \frac{4 + 3(3+h) - (3+h)^2 - (4 + 3(3) - 3^2)}{h}$$

$$= \frac{4 + 9 + 3h - 9 - 6h - h^2 - 4}{h}$$

$$= \frac{-3h - h^2}{h} = \boxed{-3 - h}$$

22. $f(x) = \frac{x+3}{x+1}$

$$\frac{f(x) - f(1)}{x-1} = \frac{\frac{x+3}{x+1} - 2}{x-1}$$

$$= \frac{\frac{x+3 - 2(x+1)}{x+1}}{x-1}$$

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

$$= \frac{-1}{x+1}$$

23. $f(x) = \frac{x}{3x-1}$

Domain is $\{x \mid x \neq 1/3\}$

24. $f(x) = \frac{5x+4}{x^2+3x+2}$

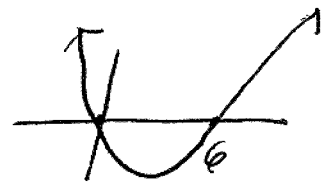
Domain is $x^2+3x+2 \neq 0$

$$\uparrow$$

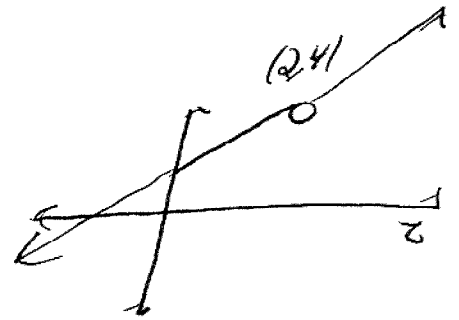
$$(x+2)(x+1)$$

$$\boxed{(x \neq -2, x \neq -1)}$$

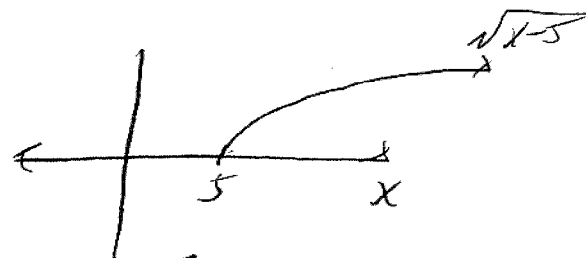
31. $f(t) = t^2 - 6t$ Domain $(-\infty, \infty)$



32. $H(t) = \frac{4-t^2}{2-t} = \frac{(2+t)(2-t)}{2-t}$
 Domain = $\{t \mid t \neq 2\}$
 Notice $H(t) = 2+t$ for any $t \neq 2$

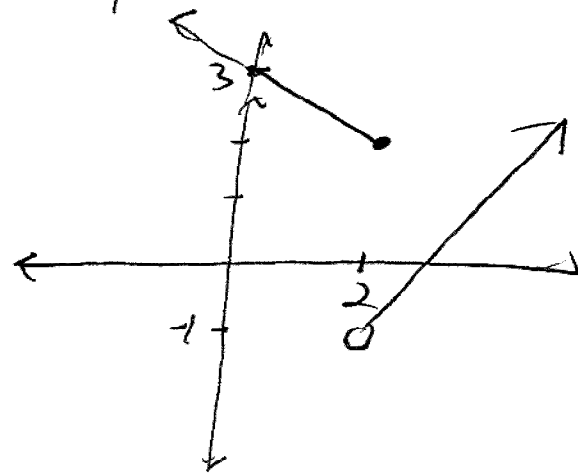


33. $g(x) = \sqrt{x-5}$
 Domain = $[5, \infty)$

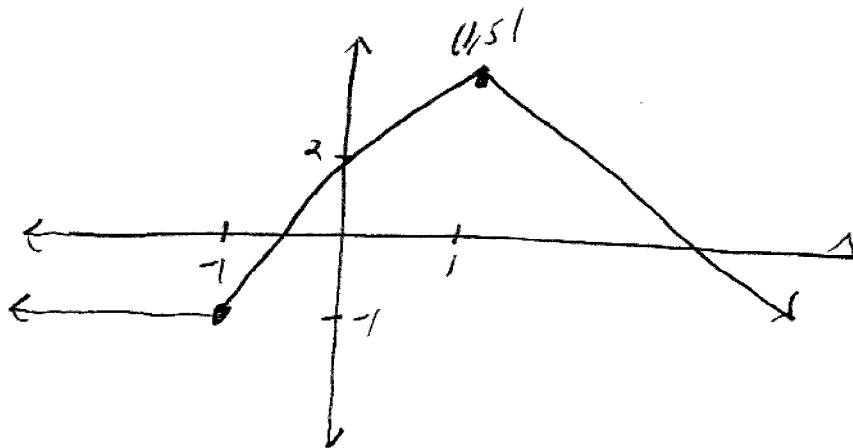


38. $f(x) = \begin{cases} 3 - \frac{1}{2}x & x \leq 2 \\ 2x - 5 & \text{if } x > 2 \end{cases}$

Domain $(-\infty, \infty)$

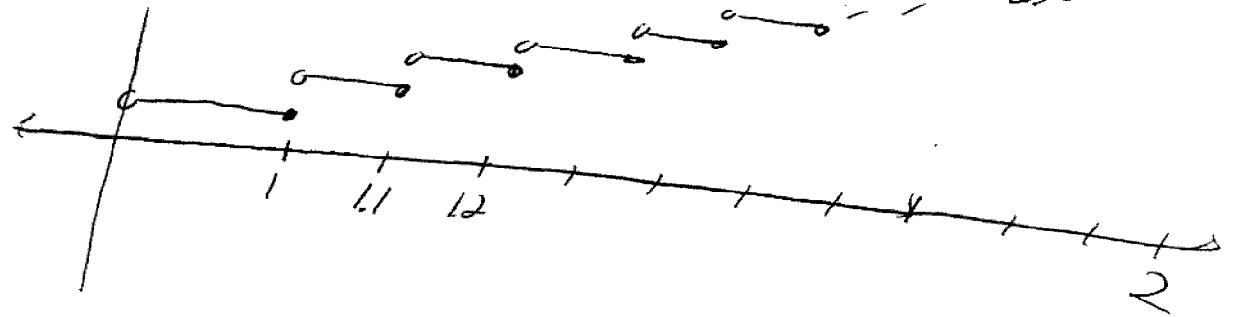


40. $f(x) = \begin{cases} -1 & x \leq -1 \\ 3x+2 & -1 < x < 1 \\ 7-2x & x \geq 1 \end{cases}$

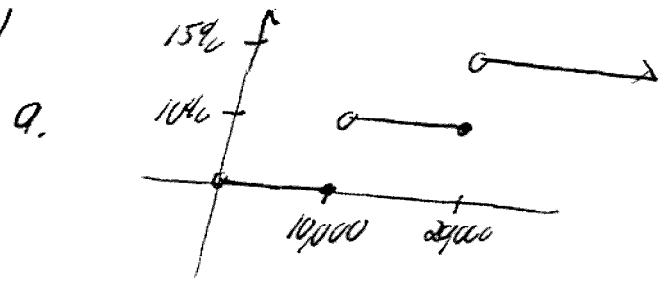


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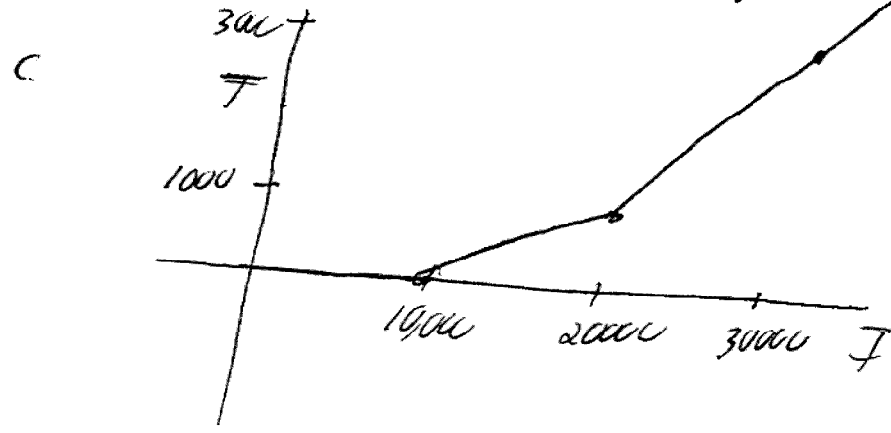
$C(x) =$	$\begin{cases} 2 & 0 < x \leq 1 \\ 2.2 & 1 < x \leq 1.1 \\ 2.4 & 1.1 < x \leq 1.2 \\ 2.6 & 1.2 < x \leq 1.3 \\ 2.8 & 1.3 < x \leq 1.4 \\ 3.0 & 1.4 < x \leq 1.5 \end{cases}$	$\begin{cases} 3.2 & 1.5 < x \leq 1.6 \\ 3.4 & 1.6 < x \leq 1.7 \\ 3.6 & 1.7 < x \leq 1.8 \\ 3.8 & 1.8 < x \leq 1.9 \\ 4.0 & 1.9 < x \leq 2.0 \end{cases}$
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b Tax on 14000 = $0 \cdot 10000 + 0.1 \cdot 4000 \rightarrow 4000$



52. many possible answers!

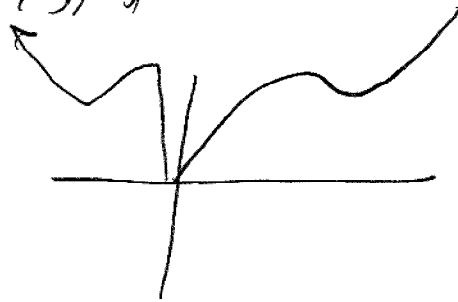
53. g is even, f is odd

54. f is neither, g is even

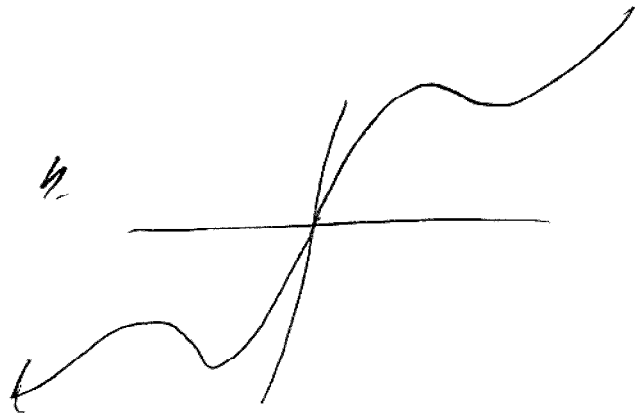
55 a. $(-5, 3)$

b. $(-5, 3)$

56 a.



b.



$$57. f(x) = \frac{x}{x^2+1} \quad f(-x) = \frac{-x}{x^2+1} = -f(x) \quad \text{odd}$$

$$58. f(x) = \frac{x^2}{x^4+1} \quad f(-x) = \frac{x^2}{x^4+1} = f(x) \quad \text{even}$$

$$59. f(x) = \frac{x}{x+1} \quad f(-x) = \frac{-x}{-x+1} \quad \text{neither}$$

$$60. f(x) = |x| \quad f(-x) = \begin{cases} x^2 & x \geq 0 \\ -x^2 & x < 0 \end{cases} = f(x) \quad \text{even}$$
$$= \begin{cases} x^2 & x \geq 0 \\ -x^2 & x < 0 \end{cases}$$

61. even 62. neither

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

b. Set $f(x) = ax^2 + bx + c$ and plug in
 $f(2) = 2$, $f(0) = 1$, $f(1) = -2.5$

$$\begin{aligned} 2 &= 4a - 2b + c \\ 1 &= c \\ -2.5 &= a + b + c \end{aligned}$$

So $c = 1$ and $1 = 4a - 2b$
 $-3.5 = a + b$

$$b = -3.5 - a$$

$$1 = 4a - 2(-3.5 - a)$$

$$1 = 4a + 7 + 2a \quad 6a = -6 \quad a = -1 \quad b = -2.5$$

$$f(x) = -x^2 - 2.5x + 1$$

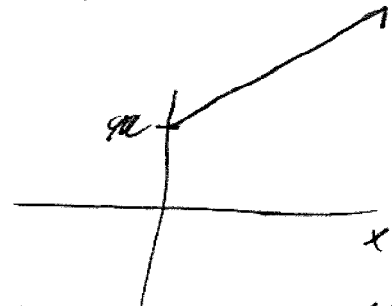
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a. Let $C(x) = mx + b$ Given $C(100) = 2200$ $C(300) = 4800$
 so

$$\begin{aligned} 100x + b &= 2200 \\ 300x + b &= 4800 \Rightarrow 200x = 2600 \\ x &= 13 \end{aligned}$$

$$\begin{aligned} 1300 + b &= 2200 \\ b &= 900 \end{aligned}$$

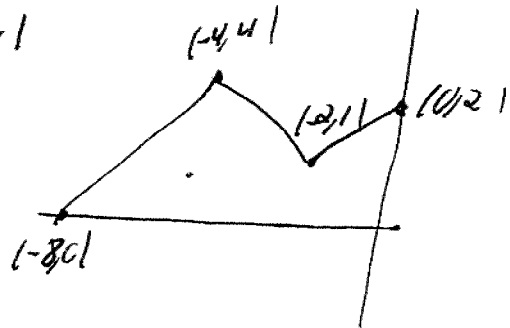
$$C(x) = 13x + 900$$



b. Slope = 13 is the cost to manufacture 1 additional chair (marginal cost)
 c. y-int = 900 is the fixed overhead cost.

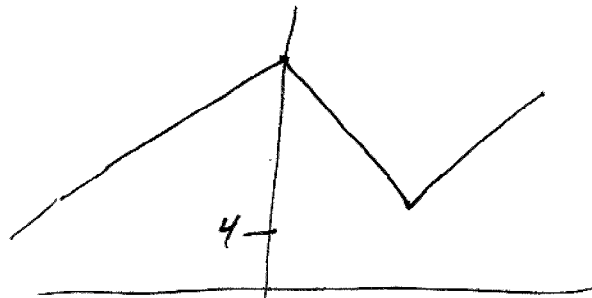
17. a. 3 d. 5
 b. 1 e. 2
 c. 4

18 a. $f(x+4)$



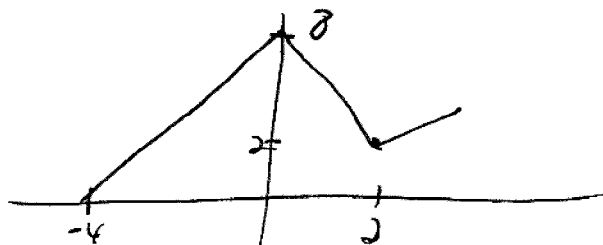
4 units left

b

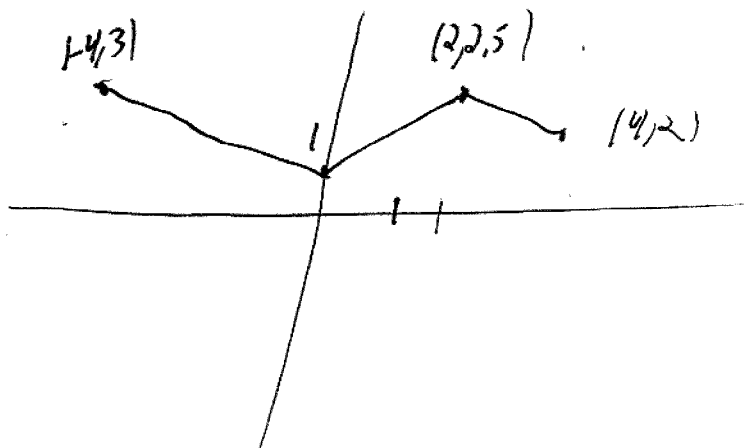


4 units up

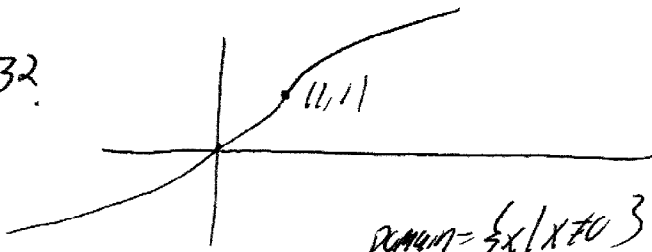
c



d



32.



$$\text{Domain} = \{x \mid x \neq 0\}$$

$$38. f \circ g = 1 - \left(\frac{1}{x}\right)^3 \quad g \circ f = \frac{1}{1-x^3} \quad \leftarrow \text{Domain} = \{x \neq 1\}$$

$$f \circ f = 1 - (1-x^3)^3 \quad g \circ g = x \quad \leftarrow \text{Domain } (-\infty, \infty)$$

$$43. F(x) = (x^2 + 1)^{10} \quad g(x) = x^2 + 1 \quad f(x) = x^{10}$$

$$F = f \circ g$$

$$46. F(x) = \sin|\sqrt{x}| \quad g(x) = \sqrt{x} \quad f(x) = \sin x$$

$$F = f \circ g$$

$$52. a. 5 \quad b. 2 \quad c. 4 \quad d. 3 \quad e. 1 \quad f. 4$$

$$53. a. 4 \quad b. 3 \quad c. 0 \quad d. \text{Not Define } \begin{matrix} f(6) = 6 \text{ and} \\ g(6) \text{ is not define} \end{matrix}$$

$$e. 4 \quad f. -2$$