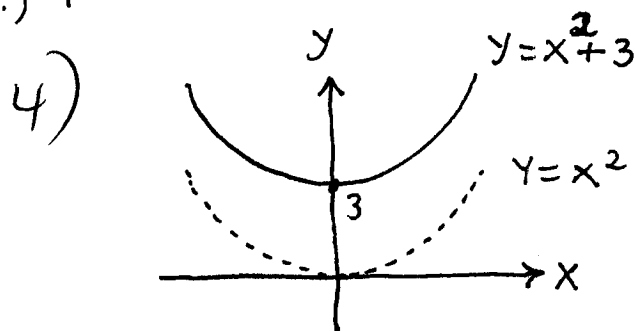
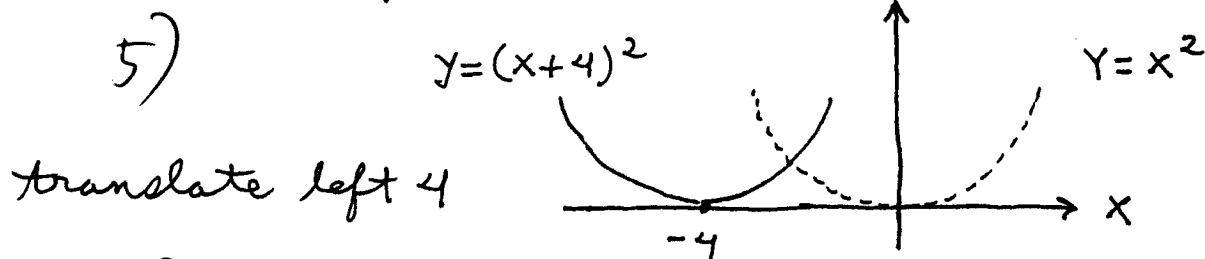


Section 3.4

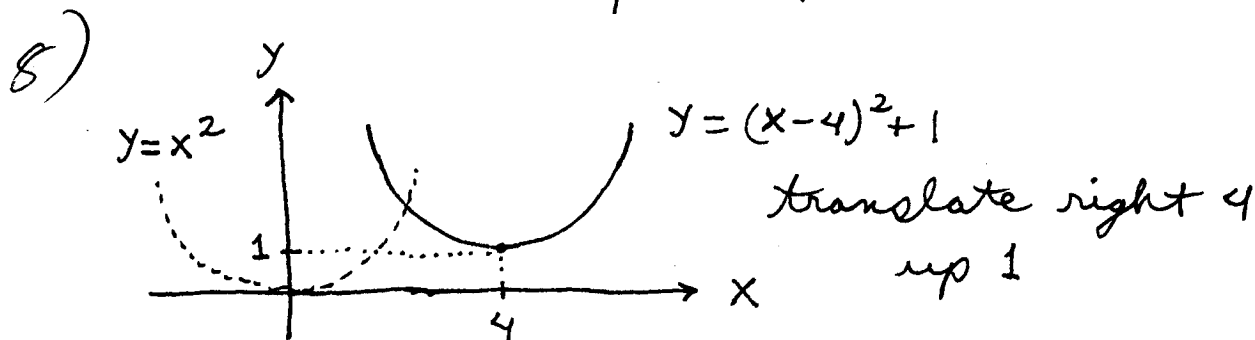
- 2) a.) K b.) B c.) J d.) L e.) A
 f.) C g.) E h.) D i.) H j.) G k.) I
 l.) F



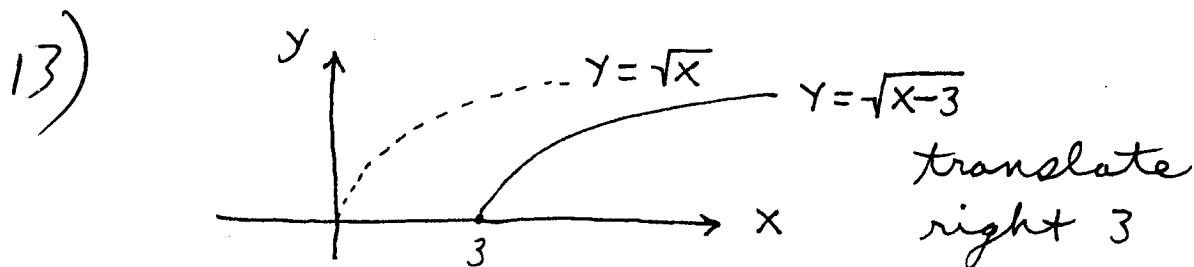
translate up 3



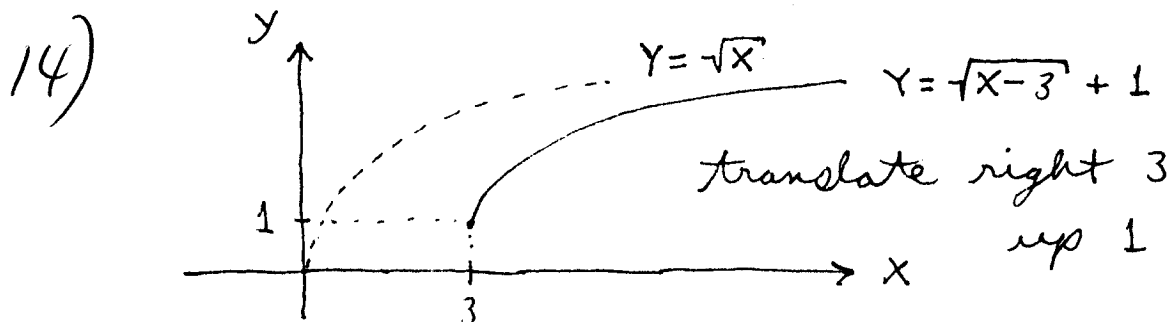
translate left 4



translate right 4
up 1

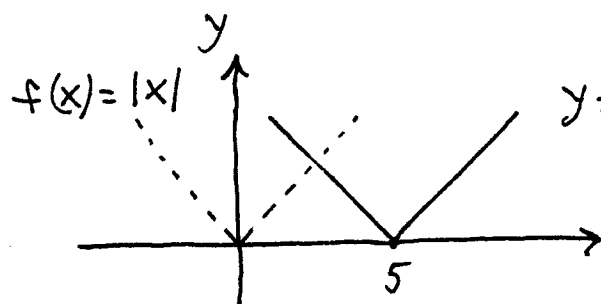


translate
right 3



translate right 3
up 1

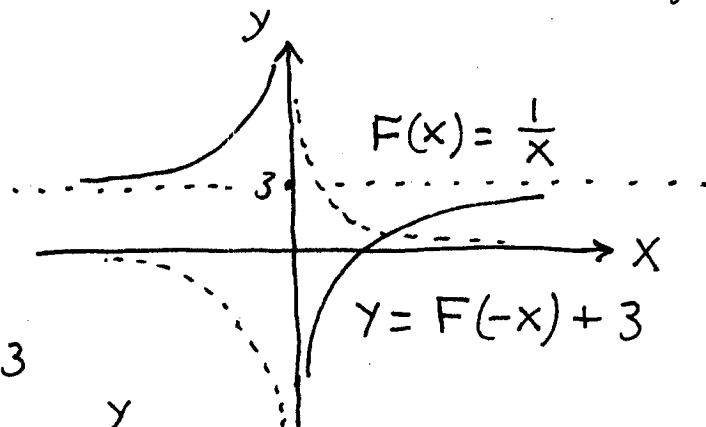
25)

translate
right 5

34)

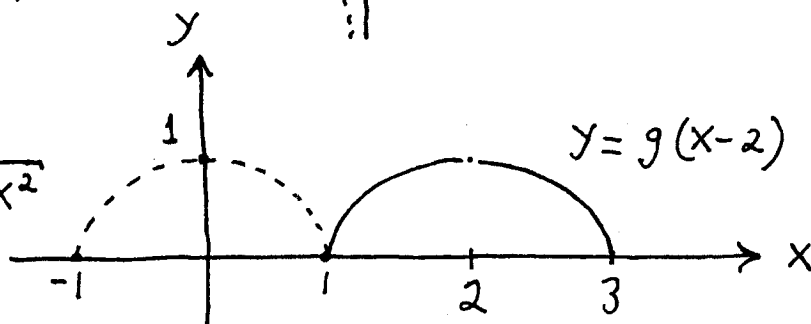
reflect in
y-axis

translate up 3



35)

$$g(x) = \sqrt{1-x^2}$$

translate
right 2

58)

- a.) translate right 3 : $(a+3, b)$
 b.) translate down 3 : $(a, b-3)$
 c.) translate right 3 down 3 : $(a+3, b-3)$
 d.) reflect in x-axis : $(a, -b)$
 e.) reflect in y-axis : $(-a, b)$
 f.) reflect in y-axis, reflect in x-axis : $(-a, -b)$
 g.) translate left 3, reflect in y-axis :
 $(3-a, b)$
 h.) translate left 3, reflect in y-axis,
 reflect in x-axis, translate up 1 :
 $(a, b) \rightarrow (a-3, b) \rightarrow (3-a, b)$
 $\rightarrow (3-a, -b) \rightarrow (3-a, 1-b)$
 x-axis

Section 3.5

9) $f(x) = 3x + 1, g(x) = -2x - 5$

a.) $(f \circ g)(x) = f(g(x)) = f(-2x - 5) = 3(-2x - 5) + 1$
 $= -6x - 15 + 1 = -6x - 14$

c.) $(g \circ f)(x) = g(f(x)) = g(3x + 1) = -2(3x + 1) - 5$
 $= -6x - 2 - 5 = -6x - 7$

10) $f(x) = 1 - 2x^2, g(x) = x + 1$

a.) $(f \circ g)(x) = f(g(x)) = f(x + 1) = 1 - 2(x + 1)^2$
 $= 1 - 2(x^2 + 2x + 1) = 1 - 2x^2 - 4x - 2 = -2x^2 - 4x - 1$

c.) $(g \circ f)(x) = g(f(x)) = g(1 - 2x^2)$
 $= (1 - 2x^2) + 1 = 2 - 2x^2$

12) $h(x) = 4x^2 - 5x + 1, k(x) = x, m(x) = 7$

a.) $h(k(x)) = h(x) = 4x^2 - 5x + 1$

b.) $k(h(x)) = k(4x^2 - 5x + 1) = 4x^2 - 5x + 1$

c.) $h(m(x)) = h(7) = 4(49) - 5(7) + 1 = 162$

d.) $m(h(x)) = 7$

e.) $k(m(x)) = k(7) = 7$

f.) $m(k(x)) = 7$

13) $F(x) = \frac{3x-4}{3x+3}, G(x) = \frac{x+1}{x-1}$

a.) $(F \circ G)(x) = F(G(x)) = F\left(\frac{x+1}{x-1}\right) = \frac{3\left(\frac{x+1}{x-1}\right) - 4}{3\left(\frac{x+1}{x-1}\right) + 3}$

$$= \frac{3\left(\frac{x+1}{x-1}\right) - 4}{3\left(\frac{x+1}{x-1}\right) + 3} \cdot \frac{x-1}{x-1} = \frac{3(x+1) - 4(x-1)}{3(x+1) + 3(x-1)}$$

$$= \frac{3x+3-4x+4}{3x+3+3x-3} = \frac{7-x}{6x}$$

$$d.) (G \circ F)(x) = G(F(x)) = G\left(\frac{3x-4}{3x+3}\right) = \frac{\left(\frac{3x-4}{3x+3}\right) + 1}{\left(\frac{3x-4}{3x+3}\right) - 1}$$

$$= \frac{\left(\frac{3x-4}{3x+3}\right) + 1}{\left(\frac{3x-4}{3x+3}\right) - 1} \cdot \frac{3x+3}{3x+3} = \frac{(3x-4) + (3x+3)}{(3x-4) - (3x+3)} = \frac{6x-1}{-7}$$

$$17) \quad a.) f(g(3)) = f(0) = 1$$

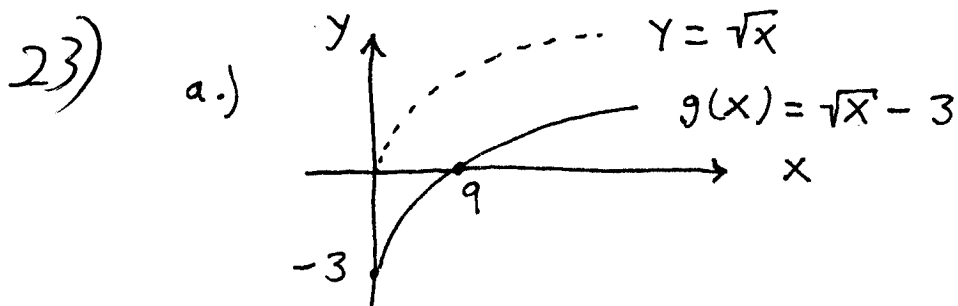
$$b.) g(f(3)) = g(4) = -3$$

$$c.) f(h(3)) = f(2) = -1$$

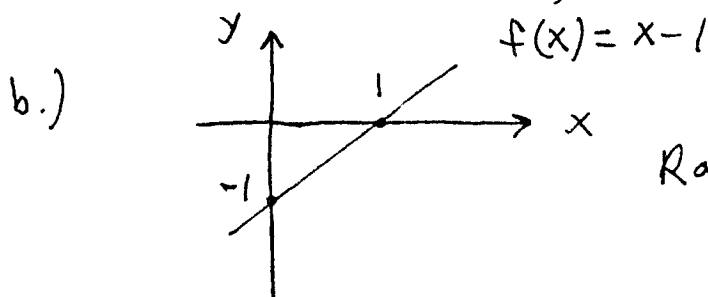
$$d.) (h \circ g)(2) = h(g(2)) = h(1) = 2$$

$$e.) h(f(g(3))) = h(f(0)) = h(1) = 2$$

$$f.) (g \circ f \circ h \circ f)(2) = g(f(h(f(2)))) \\ = g(f(h(-1))) = g(f(3)) = g(4) = -3$$

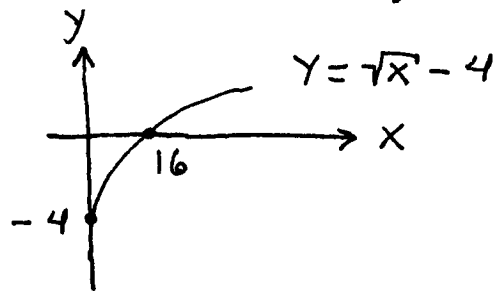


Domain : all $x \geq 0$, Range : all $y \geq -3$



Domain : all x -values,
Range : all y -values

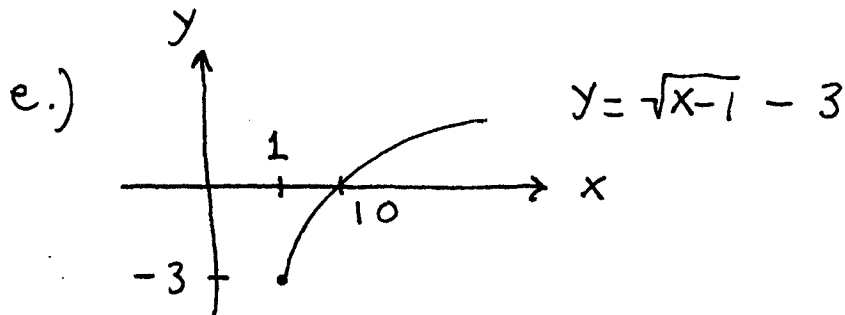
$$c.) \quad (f \circ g)(x) = f(g(x)) = f(\sqrt{x} - 3) \\ = (\sqrt{x} - 3) - 1 = \sqrt{x} - 4$$



Domain: all $x \geq 0$,
Range: all $y \geq -4$.

$$d.) \quad g(f(x)) = g(x-1) = \sqrt{x-1} - 3$$

Domain: all $x \geq 1$



$$46) \quad g(x) = 2x + 1 \quad \text{then} \quad (g \circ f)(x) = 10x - 7 \rightarrow \\ g(f(x)) = 10x - 7 \rightarrow 2f(x) + 1 = 10x - 7 \rightarrow \\ 2f(x) = 10x - 8 \rightarrow f(x) = \frac{1}{2}(10x - 8) \rightarrow$$

$$f(x) = 5x - 4.$$

Worksheet 4

1) Let $f(x) = x^3$ and $g(x) = 1+x^2 \rightarrow$
 $(f \circ g)(x) = f(g(x)) = f(1+x^2) = (1+x^2)^3$

2) Let $f(x) = \frac{1}{x}$ and $g(x) = 1+x^4 \rightarrow$
 $(f \circ g)(x) = f(g(x)) = f(1+x^4) = \frac{1}{1+x^4}$

3) $N(T) = -2T^2 + 240T - 5400$, $T(t) = 10t + 40$
a.) $N(T(t)) = N(10t + 40)$
 $= -2(10t + 40)^2 + 240(10t + 40) - 5400$
 $= -2(100t^2 + 800t + 1600)$
 $\quad + 2400t + 9600 - 5400$
 $= -200t^2 - 1600t - 3200 + 2400t + 4200$
 $= -200t^2 + 800t + 1000 \quad \text{or}$
 $N(T(t)) = -200t^2 + 800t + 1000$

b.) $t = 0 \text{ hr.} \rightarrow N(T(0)) = 0 + 0 + 1000$
 $= 1000 \text{ bacteria ;}$
 $t = 2 \text{ hr.} \rightarrow N(T(2)) = -800 + 1600 + 1000$
 $= 1800 \text{ bacteria ;}$
 $t = 5 \text{ hr.} \rightarrow N(T(5)) = -5000 + 4000 + 1000$
 $= 0 \text{ bacteria .}$