Ch 2 Study Guide Solutions

1a) $f(x) = \frac{Ax+5}{6x-2}$

$f(1) = \frac{A\cdot 1+5}{6\cdot 1-2} = \frac{A+5}{4}$

$\frac{A+5}{4} = 4\cdot 4$

$A+5 = 16$

$\boxed{A = 11}$

b) $g(x) = \frac{A}{x} + \frac{8}{x^2}$

$g(-1) = \frac{A}{-1} + \frac{8}{(-1)^2} = -A+8$

$-A+8 = 0$

$-A = -8$

$\boxed{A = 8}$

2) a) $f(-7) = -5(-7)^2 - 6(-7)$

$= -5\cdot 49 + 42$

$= -245 + 42$

$\boxed{= -203}$

b) $f(3a) = -5(3a)^2 - 6(3a)$

$= -5\cdot 9a^2 - 18a$

$\boxed{= -45a^2 - 18a}$

c) $f(x-1) = -5(x-1)^2 - 6(x-1)$

$= -5(x^2-2x+1) - 6x + 6$

$= -5x^2 + 10x - 5 - 6x + 6$

$\boxed{= -5x^2 + 4x + 1}$

3) a) $f(x) = \frac{6x}{9x+1}$

$9x+1 \neq 0$

$9x \neq -1$

$x \neq -\frac{1}{9}$

$\boxed{D = (-\infty, -\frac{1}{9}) \cup (-\frac{1}{9}, \infty)}$

b) $f(x) = \sqrt{8-3x}$

$8-3x \geq 0$

$-3x \geq -8$

$x \leq \frac{8}{3}$

$\boxed{D = (-\infty, \frac{8}{3}]}$

c) $f(x) = \frac{x^2}{x^4+7}$

x^4+7 always positive

so $\boxed{D = (-\infty, \infty)}$

4a) $(f \circ g)(-2)$

$= f(4(-2)^2 - 1)$

$= f(4 \cdot 4 - 1)$

$= f(15)$

$= 7 \cdot 15 - 9$

$= 96$

b) $(g \circ f)(3)$

$= g(7 \cdot 3 - 9)$

$= g(12)$

$= 4 \cdot 12^2 - 1$

$= 4 \cdot 144 - 1$

$= 575$

c) $(f \circ f)(x)$

$= f(7x - 9)$

$= 7(7x - 9) - 9$

$= 49x - 63 - 9$

$= 49x - 72$

d) $(g \circ f)(x)$

$= g(7x - 9)$

$= 4(7x - 9)^2 - 1$

$= 4(49x^2 - 126x + 81) - 1$

$= 196x^2 - 504x + 324 - 1$

$= 196x^2 - 504x + 323$

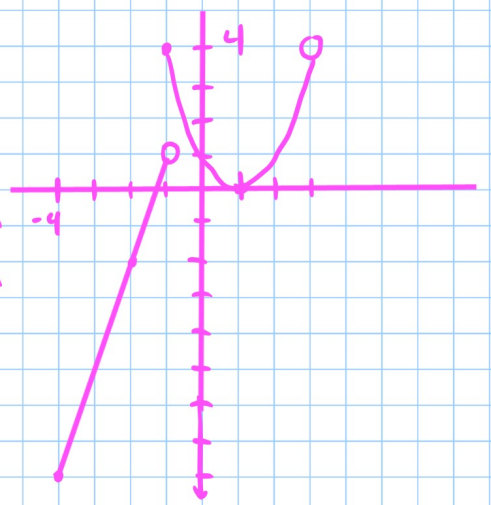
5)

$y = f(x)$	$y = f(x+5)$ left 5 subtract 5 from x	$y = -3f(x-2)$ mult y by -3 add 2 to x	$y = 2f(x) + 1$ mult y by 2 add 1 to y	$y = 3f(x-2) + 7$ mult y by 3, add 7 add 2 to x
$(0, -7)$	$(-5, -7)$	$(2, 21)$	$(0, -13)$	$(2, -14)$
$(3, -10)$	$(-2, -10)$	$(5, 30)$	$(3, -19)$	$(5, -23)$
$(-2, -8)$	$(-7, -8)$	$(0, 24)$	$(-2, -15)$	$(0, -17)$
$(-5, 6)$	$(-10, 6)$	$(-3, -18)$	$(-5, 13)$	$(-3, 25)$

6) i) $f(x) = \begin{cases} 3x+4 & -4 \le x < -1 \\ (x-1)^2 & -1 \le x < 3 \end{cases}$

a)

x	y
-4	-8
-2	-2
-1	1 ← open
-1	4 ← closed
1	0
3	4



b) $D = [-4, 3)$

c) $f(-4) = -8$

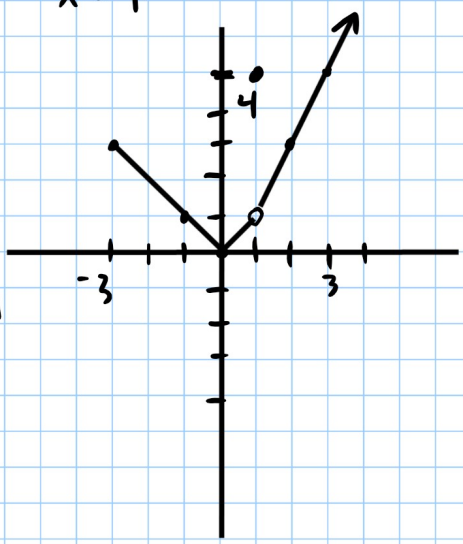
d) $f(-1) = 4$

e) $f(3) =$ undefined

ii) $f(x) = \begin{cases} |x| & -3 \le x < 1 \\ 5 & x = 1 \\ 2x-1 & x > 1 \end{cases}$

a)

x	y
-3	3
-1	1
0	0
1	1 ← open
1	5 ← closed
1	1 ← open
2	3
3	5



b) $D = [-3, \infty)$

c) $f(-3) = 3$

d) $f(1) = 5$

e) $f(3) = 5$

7) i) a) no intercepts

b) $D = (-\infty, 0) \cup (0, \infty)$

$R = (0, \infty)$

c) increasing $(-\infty, 0)$

decreasing $(0, \infty)$

d) even (y-axis symmetry)

ii) a) $(-2,0), (0,0), (2,0)$

b) $D = [-2, 2]$

$R = [-20, 20]$

c) increasing $[-1, 1]$

decreasing $[-2, -1]$ and $[1, 2]$

d) odd (origin symmetry)

8) a) $A = \frac{1}{2}xy$

by $y = x^3$

so $A = \frac{1}{2} \cdot x \cdot x^3$

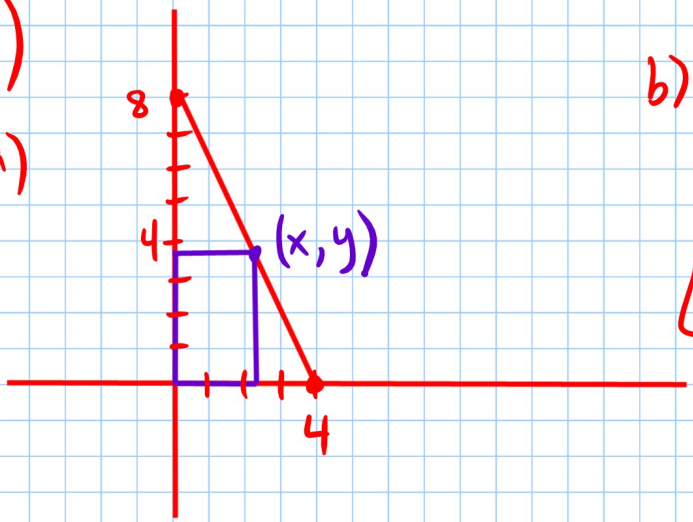
$$A(x) = \frac{1}{2}x^4$$

b) $A(3) = \frac{1}{2} \cdot 3^4 = \frac{1}{2} \cdot 81 = \frac{81}{2}$

c) no because we can let x be anything

9)

a)



b) $A = xy$

$A = x(8-2x)$

$$A(x) = 8x - 2x^2$$

c) $D = (0,4)$

d) $x = 2$ (calculator)

max area $= 8 \cdot 2 - 2 \cdot 2^2$

$= 16 - 8$

$= 8$