SOLUTIONS - TEST 2
201-009-50
OCT 2009

1 (a) $(f \circ h)(-3x)$

$= f(h(-3x))$

$= f(-2(-3x)+6)$

$= f(6x+6)$

$= \dfrac{3}{6x+6} = \boxed{\dfrac{1}{2x+2}}$

(b) $(h \circ g)(t)$

$= h(g(t))$

$= h(-z^2-z)$

$= -2(-z^2-z)+6$

$= \boxed{2z^2+2z+6}$

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

$= g(f(x))$

$= g\left(\frac{3}{x}\right)$

$= -\left(\frac{3}{x}\right)^2 - \frac{3}{x}$

$= \boxed{-\dfrac{9}{x^2} - \dfrac{3}{x}}$

(d) $(f \circ f)(a^2)$

$= f(f(a^2))$

$= f\left(\frac{3}{a^2}\right)$

$= \dfrac{3}{3/a^2} = \boxed{a^2}$

(e) $(f \circ h \circ g)(2)$

$= (f \circ h)(-2^2-2)$

$= (f \circ h)(-6)$

$= f(h(-6))$

$= f(-2(-6)+6)$

$= f(18) = \dfrac{3}{18} = \boxed{\dfrac{1}{6}}$

2

$$\frac{a+2}{a-4} + \frac{26-a^2}{12-a^2+a} = \frac{2a-3}{a+3}$$

$$\frac{a+2}{a-4} + \frac{26-a^2}{-(a-4)(a+3)} = \frac{2a-3}{a+3}$$

$$\frac{(a+2)(a+3)}{(a-4)(a+3)} - \frac{26-a^2}{(a-4)(a+3)} = \frac{(2a-3)(a-4)}{(a+3)(a-4)}$$

$$\frac{a^2+5a+6-26+a^2}{(a-4)(a+3)} = \frac{2a^2-11a+12}{(a+3)(a-4)}$$

$$2a^2+5a-20 = 2a^2-11a+12$$

$$5a-20 = -11a+12$$

$$16a = 32$$

$$\boxed{a = 2}$$

3 (a) $(-\infty, 4]$ (b) $(1, \infty)$ (c) $\mathbb{R} \setminus \{\pm 7\}$

(d) $h(t) = \sqrt{(t-4)(t-1)}$

	$(-\infty, 1)$	$(1,4)$	$(4, \infty)$
TEST	0	2	5
sign under SQUARE ROOT	+	−	+

DOMAIN $(-\infty, 1] \cup [4, \infty)$

4 (a) $y = -3x^2 + 5x + 2$

vertex $x = \frac{-b}{2a} = \frac{-5}{2(-3)} = \frac{5}{6}$

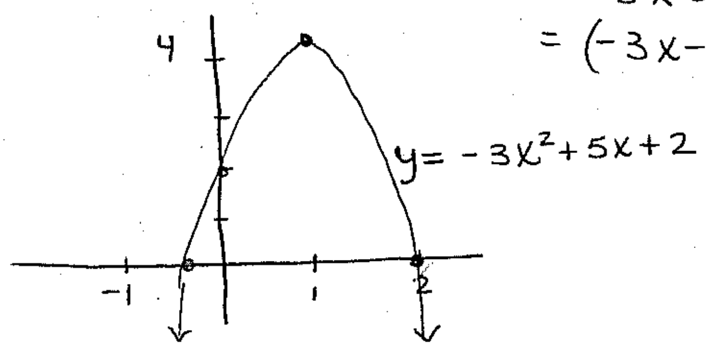
$y = -3\left(\frac{5}{6}\right)^2 + 5\left(\frac{5}{6}\right) + 2 = \frac{49}{12}$ $\left(\frac{5}{6}, \frac{49}{12}\right)$

y-intercept $(0, 2)$

x-intercepts $y = -3x^2 + 6x - x + 2$

$= -3x(x-2) - 1(x-2)$

$= (-3x-1)(x-2)$ $x = 2$ $x = -1/3$



(b) DOMAIN $\mathbb{R}$

RANGE $\left(-\infty, \frac{49}{12}\right]$

5 (a) $h(0) = \boxed{3}$

(b) $0 = -16t^2 + 96t + 3$

$t = \frac{-96 \pm \sqrt{96^2 - 4(-16)(3)}}{2(-16)}$

$= \frac{-96 \pm 97}{-32}$ $t = \boxed{6.03\ s}$ & $t = -0.03\ s$ impossible

(c) vertex $t = \frac{-96}{2(-16)} = 3\ s$

$h(3) = -16(3)^2 + 96(3) + 3 = \boxed{147\ m}$

6 (a) $f(-2) + g(1)$

$= \left(-3(-2)^2 - (-2)\right) + [2(1)+7]$

$= (-12+2) + 9$

$= -10 + 9 = \boxed{-1}$

(b) $f(a) + g(a^2)$

$= -3a^2 - a + 2a^2 + 7$

$= \boxed{-a^2 - a + 7}$

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

$= f(g(3))$

$= f(2(3)+7)$

$= f(13)$

$= -3(13)^2 - 13$

$= \boxed{-520}$

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

$= g(f(3))$

$= g(-3(3)^2 - 3)$

$= g(-30)$

$= 2(-30) + 7$

$= \boxed{-53}$

7 $m = \frac{-2-5}{-3-2} = \frac{-7}{-5} = \frac{7}{5}$

$m = \frac{3-(-1)}{K-4} = \frac{4}{K-4}$

$\frac{7}{5} =$ Negative Reciprocal

$\frac{7}{5} = -\left(\frac{K-4}{4}\right)$

$\frac{7}{5} = \frac{-K+4}{4}$

$28 = -5K + 20$

$8 = -5K$

$\boxed{K = \frac{8}{-5}}$

8 (a) $7x - 32 = 10 - 2(3-x)$

$7x - 32 = 10 - 6 + 2x$

$5x = 36$

$\boxed{x = \frac{36}{5}}$

(b) $5x^2 - 7x - 6 = 0$

$5x^2 + 3x - 10x - 6 = 0$

$x(5x+3) - 2(5x+3) = 0$

$(5x+3)(x-2) = 0$

$\boxed{x = 2 \qquad x = -\frac{3}{5}}$

(c) $4x^2 - 9 = 0$

$(2x+3)(2x-3) = 0$

$\boxed{x = \pm\frac{3}{2}}$

(d) $(3x+4)(x-3) = (x-6)(x+2)$

$3x^2 - 5x - 12 = x^2 - 4x - 12$

$2x^2 - x = 0$

$x(2x-1) = 0$

$\boxed{x = 0 \qquad x = 1/2}$

9. A line has the form $f(x) = mx + b$

Two points $(2,1)$ & $(-1,2)$

$$m = \frac{2-1}{-1-2} = \frac{1}{-3}$$

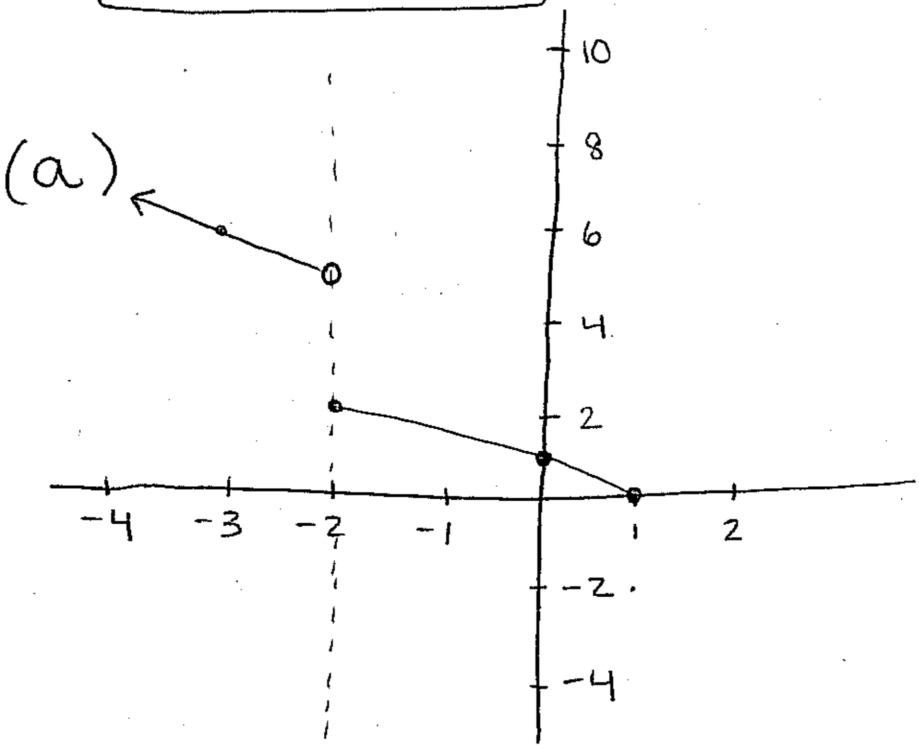
$$f(x) = -\frac{1}{3}x + b$$

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

$$2 = \frac{1}{3} + b \qquad b = 5/3$$

$$\boxed{f(x) = -\frac{1}{3}x + \frac{5}{3}}$$

10. (a)



$\boxed{\sqrt{1-x}}$

x	y
1	0
0	1
-3	2
-8	3
-2	$\sqrt{3} = 1.7$

$\boxed{-x+3}$

x	y
-2	5
-3	6
-4	7

(b) Domain

$(-\infty, 1]$

Range

$[0, \sqrt{3}] \cup (5, \infty)$