Burckel, Moore, [illegible]
(8) (8)

Name: Key
Recitation Instructor:
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College Algebra – Exam 2
March 3, 2009

Page 1 22 pts.	Page 2 28 pts.	Page 3 24 pts.	Page 4 26 pts.	TOTAL 100 pts

Directions: You will find 13 problems listed below. Please show all your work neatly and box your final answers. No notes or books are allowed. You have one hour to complete this exam.

1. (10 points) Given the points $(-4, 5)$ and $(3, -2)$,
   $x_1\ y_1 \qquad x_2\ y_2$

   (a) Find the slope of the line connecting the two points.

   $m = \frac{y_2 - y_1}{x_2 - x_1}$ or $\frac{y_1 - y_2}{x_1 - x_2}$ $\qquad m = \frac{-2-5}{3-^-4} = \frac{-7}{7} = \boxed{1}$

   (b) Find an equation of the line connecting the two points.

   $y = mx + b$

   $-2 = ^-1(3) + b$ $\qquad \boxed{y = -x + 1}$

   $1 = b$

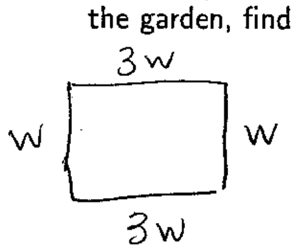
2. (6 points) Solve the equation $3(x - 4) + 2 = 6(x - 3) + 1$.

   $3x - 12 + 2 = 6x - 18 + 1$

   $3x - 10 = 6x - 17$ $\qquad \boxed{x = \frac{7}{3}}$

   $-3x = -7$

3. (6 points) A rectangular garden has a perimeter of 240 feet. If the width is one-third the length of the garden, find the **area** of the garden. w: width of garden



$3w + 3w + w + w = 240$

$8w = 240$

$w = 30$ feet.

length = 90 feet

Area = $30' \times 90'$

= $\boxed{2700 \text{ sq. feet}}$

Paulhus (8), Shrestha (8)

4. (8 points) Given $f(t) = 4t^2 + 3t$ and $g(x) = x + 2$, find the following and simplify completely:

(a) $f(g(x)) = f(x+2) = 4(x+2)^2 + 3(x+2)$

$= 4(x^2+4x+4) + 3x + 6$

$= 4x^2 + 16x + 16 + 3x + 6 = \boxed{4x^2 + 19x + 22}$

(b) $f(g(1))$

$g(1) = 1 + 2 = 3$

$f(g(1)) = f(3) = 4(3)^2 + 3(3)$

$= 36 + 9$

$= \boxed{45}$

5. (6 points) Find the equation for the graph which results when the graph of $\sqrt{x}$ is shifted left 6 units and down 4 units.

$\boxed{f(x) = \sqrt{(x+6)} - 4}$

6. (8 points) Solve the following quadratic equation: $x^2 - 5x - 3 = 0$.

Method 1: Quadratic Formula.

a: coefficient of x^2

b: coefficient of x

c: constant term

$\frac{5 \pm \sqrt{25 - 4(1)(-3)}}{2(1)}$

$\frac{5 \pm \sqrt{37}}{2}$

$\boxed{x = \frac{5+\sqrt{37}}{2} \text{ or } x = \frac{5-\sqrt{37}}{2}}$

Method 2: Completing Square

$x^2 - 5x + \frac{25}{4} - \frac{25}{4} - 3 = 0$

$(x - \frac{5}{2})^2 - \frac{37}{4} = 0$

$(x - \frac{5}{2})^2 = \frac{37}{4}$; $x - \frac{5}{2} = \frac{\pm\sqrt{37}}{2}$

$\boxed{x = \frac{5}{2} \pm \frac{\sqrt{37}}{2}}$

7. (6 points) Evaluate and complete the following function table for $f(t) = t^3 - kt$, where k is some parameter.

t	-2	-1	0	1	2	3
$f(t)$	$-8+2k$	$-1+k$	0	$1-k$	$8-2k$	$27-3k$

Capra (4), Pigno (4), Kaminski (8)

8. (6 points) Write the quotient $\frac{2+i}{3+i}$ in standard $a+bi$ form.

$$\frac{2+i}{3+i} = \frac{2+i}{3+i}(1) = \left(\frac{2+i}{3+i}\right)\left(\frac{3-i}{3-i}\right)$$

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

$$= \frac{7+i}{10} = \boxed{\frac{7}{10}+\frac{1}{10}i}$$

9. (10 points) A company's fixed costs for producing photo frames is \$1000, while variable costs are \$6 per frame.

(a) Write a cost function modeling this situation.

$C(x) = 6x + 1000$, where x = # of frames produced

$C(x)$ = cost of producing x frames.

(b) What is the cost of producing 250 photo frames?

$C(250) = 6(250) + 1000$

$= 1500 + 1000 = \boxed{\$2500}$

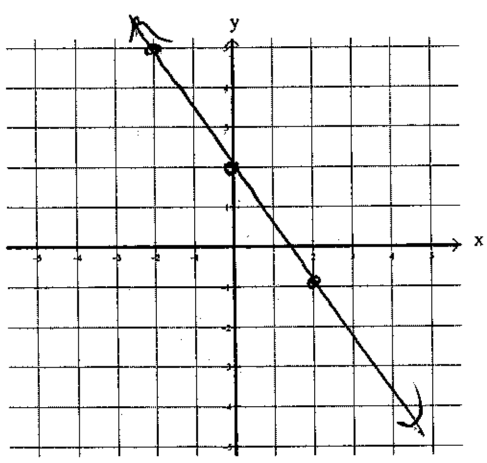
10. (8 points) Graph the line $3x + 2y = 4$ on the grid below. Show all work!

$$\frac{2y}{2} = \frac{-3x}{2} + \frac{4}{2}$$

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

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

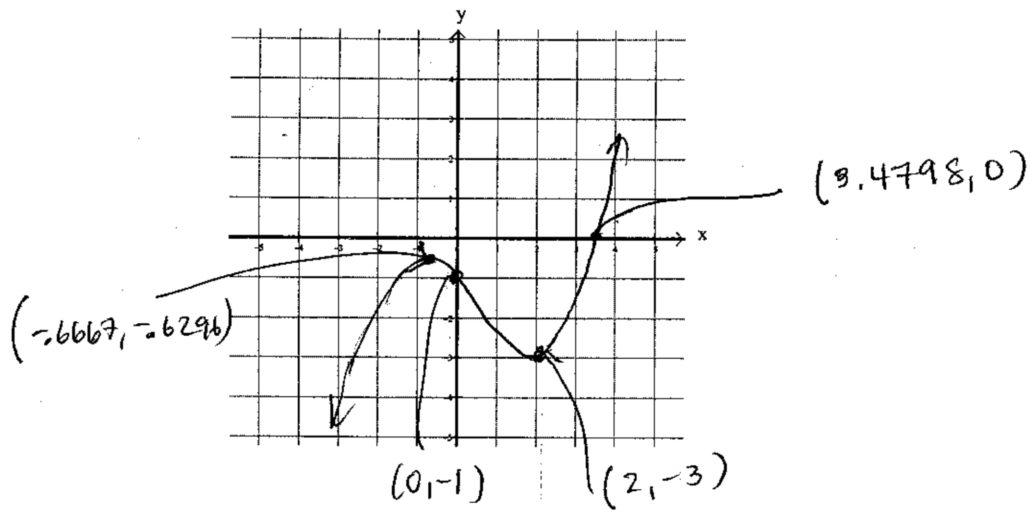
y-intercept: 2.



Sorokin (6) Natarajan (4) ~~[illegible]~~ (6) Trockelman

11. (12 points)

(a) On the grid below, graph $f(x) = .25x^3 - .5x^2 - x - 1$ over the following intervals: $-5 \le x \le 5$ and $-5 \le y \le 5$. Using your graphing calculator, find and label all intercepts and relative extrema.



(b) On what x-interval is $f(x)$ decreasing?

$\boxed{(-.6667, 2)}$

12. (6 points) Given $P(x) = 30x + .2x^2$, for what value of x does $P(x)$ attain a minimum value, and what is the minimum value? You must use algebra to justify your answer, calculator explanations will not receive full credit.

Method 1: Completing Square to find vertex. Since $a > 0$, the vertex is the location of a minimum.

$P(x) = .2(x^2 + 150x + 5625) - 1125$

$= .2(x+75)^2 - 1125$

vertex: $(-75, -1125)$

x-value, min. value

Method 2: vertex formula.

(h, k), where $h = \frac{-b}{2a}$, $k = P(h)$

$h = \frac{-30}{2(.2)} = \frac{-30}{.4} = -75$ (x-value of vertex)

$P(-75) = 30(-75) + .2(-75)^2$

$= -2250 + 1125$

$= -1125$ (min value)

13. (8 points) In the examples given below, is y a function of x? Explain your reasoning.

(a) $x^2 + y^2 = 9$ No; a given value of x could have 2 different y-values associated to it; for example $(0, 3)$ and $(0, -3)$.

(b) $y = (x-2)^2$ Yes, a given input x has exactly 1 output associated with it.