Name: KEY
Recitation Instructor:
Recitation Day and Time:

College Algebra – Exam 1
June 17, 2009

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

Directions: You will find 14 problems listed below. The point value of each problem is given in parentheses. 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. (6 points) Classify the following statements as True or False. If false, explain why.

   (a) $\mathbb{N} \subseteq \mathbb{Q}$ True

   (b) $\sqrt{2} \in \mathbb{Q}$ False; $\sqrt{2}$ is irrational; it cannot be expressed as a ratio of 2 integers

2. (6 points) Multiply and display answer in standard form: $(t-5)(t^2+11)$

   $\boxed{t^3-5t^2+11t-55}$

3. (6 points) Simplify completely, using only positive exponents in your answer: $(3c^2d^{-4})(2c^{-4}d^3)$

   $6c^{2-4}d^{-4+3} = 6c^{-2}d^{-1} = \boxed{\dfrac{6}{c^2d}}$

4. (6 points) Factor into linear factors: $121x^2 - 225$ $\boxed{(11x-15)(11x+15)}$

5. (6 points) Divide, and simplify if possible: $\dfrac{c^2-d^2}{c+d} \div \dfrac{c-d}{c+d}$

$$\frac{c^2-d^2}{c+d} \div \frac{c-d}{c+d} = \frac{c^2-d^2}{c+d} \cdot \frac{c+d}{c-d}$$

$$= \frac{(\cancel{c-d})\cancel{(c+d)}}{\cancel{(c+d)}} \cdot \frac{(c+d)}{\cancel{(c-d)}} = \boxed{c+d}$$

6. (8 points) The term 'fixed costs' represents the start-up cost of operating a business (for example, machinery and building costs). The term 'variable costs' refers to the cost of producing 1 item. A company's fixed costs for producing photo frames is \$1000, while variable costs are \$5 per frame.

(a) Write a cost function modeling this situation.

Let x = # of frames

Then $\boxed{c(x) = 5x + 1000}$

(b) What is the cost of producing 350 photo frames?

$$C(350) = 5(350) + 1000$$
$$= 1750 + 1000 = \boxed{\$2{,}750}$$

7. (8 points) Given $f(t) = 4t^2 - 2t + 3$ and $g(x) = x - 2$, find the following and simplify completely:

(a) $f(g(x))$

$$f(x-2) = 4(x-2)^2 - 2(x-2) + 3$$
$$= 4(x^2-4x+4) - 2x + 4 + 3 = 4x^2 - 16x + 16 - 2x + 7$$
$$= \boxed{4x^2 - 18x + 23}$$

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

$$f(1) = 4(1)^2 - 2(1) + 3 = 4 - 2 + 3 = 5;$$

$$f(5) = 4(5)^2 - 2(5) + 3 = 4(25) - 10 + 3 = \boxed{93} = f(f(1))$$

8. (6 points) Express in terms of a single radical (no decimals): $5\sqrt{44} + \sqrt{99}$

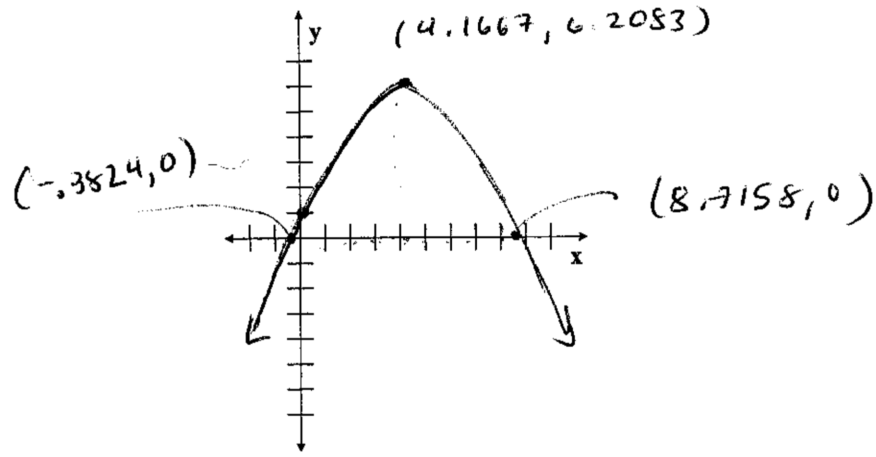
$$5\sqrt{11\cdot 4} + \sqrt{11\cdot 9} = 5\cdot 2\sqrt{11} + 3\sqrt{11} = 10\sqrt{11} + 3\sqrt{11} = \boxed{13\sqrt{11}}$$

9. (6 points) Does the relation $\{(3,2),(5,2),(7,2),(9,2)\}$ represent a function? Explain.

Yes; no two ordered pairs have the same 1st coordinate and different 2nd coordinates.

10. (12 points)

(a) On the grid below, graph $f(x) = -.3x^2 + 2.5x + 1$ over the following intervals: $-2 \leq x \leq 10$ and $-7 \leq y \leq 7$. Along with your graph, label axes and intercepts appropriately for full credit.



(b) Find the x-intercepts of this graph using your TI-83/84 and briefly explain which buttons you used.

(-.3824, 0)

(8.7158, 0)

2nd + Calc

Zero

L. Bound, enter

R. Bound, enter, Guess, enter.

(c) Find the y-value corresponding to $x = 3.49$ using your graphing calculator. Round answer to the nearest thousandth.

y = 6.09097 when x = 3.49.

11. (6 points) Identify the center and radius of the circle with equation $(x+4)^2 + (y-3)^3 = 81$.

Center: (-4, 3)

radius: 9

12. (8 points) Given the points $(-7, 9)$ and $(3, 4)$, answer the following:

$x_1\ y_1 \qquad x_2\ y_2$

(a) What is the slope of the line connecting the two points?

$$m = \frac{\Delta y}{\Delta x} = \frac{y_2 - y_1}{x_2 - x_1} = \frac{4-9}{3+7} = \frac{-5}{+10} = \frac{-1}{2}$$

(b) What is the equation of the line connecting the two points? Present final answer in slope-intercept form.

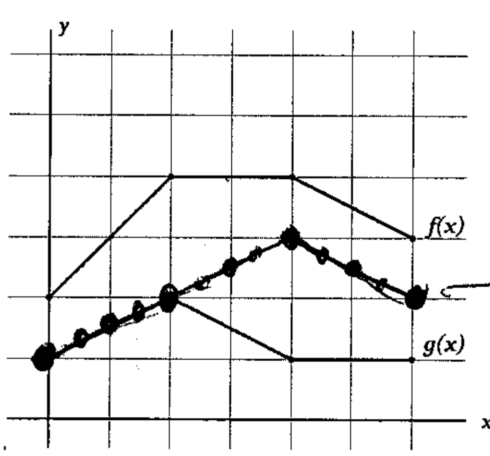
$$y = \frac{-1}{2}x + b$$
$$4 = \frac{-1}{2}(3) + b$$
$$4 = -\frac{3}{2} + b$$
$$4 + \frac{3}{2} = b$$
$$\frac{11}{2} = b$$
$$\boxed{y = \frac{-1}{2}x + \frac{11}{2}}$$

13. (6 points) Find an equation for the graph that has the shape of x^3, but shifted left 5 units and down 4 units.

$$\boxed{f(x) = (x+5)^3 - 4}$$

14. (10 points) Given the graphs of the functions $f(x)$ and $g(x)$ below, graph $(f - g)(x)$.

One needs to subtract y-values to get the desired result, $(f-g)(x)$.



$(f-g)(x)$

x	f(x)	g(x)	(f-g)(x)
0	2	1	1
2	4	2	2
4	4	1	3
6	3	1	2