Name: Key
Instructor:
Day and Time:

College Algebra – Exam 2 – July 2, 2009

Page 1 20 pts.	Page 2 24 pts.	Page 3 30 pts.	Page 4 21 pts.	TOTAL 95pts

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. (8 points) Given the following functions, state which are linear and which are quadratic:

$\underbrace{f(x) = 9 - 3x}_{\text{linear}}, \quad \underbrace{g(x) = x^2 + 14}_{\text{quadratic}}, \quad \underbrace{h(x) = (x-6)^2}_{\text{quadratic}}, \quad \underbrace{r(x) = \frac{2+5x}{7}}_{\text{linear}}$

linear: power of x is 1 — quadratic: x^2 term — quadratic: x^2 term — linear: power of x is 1.

2. (6 points) Solve the equation $4(x-9) - 3 = 3(x+2) + 1$.

$4x - 36 - 3 = 3x + 6 + 1$

$4x - 39 = 3x + 7$

$\boxed{x = 46}$

3. (6 points) Solve by factoring: $x^2 - 8x + 12 = 0$.

$(x-6)(x-2) = 0$

$x - 6 = 0$ or $x - 2 = 0$

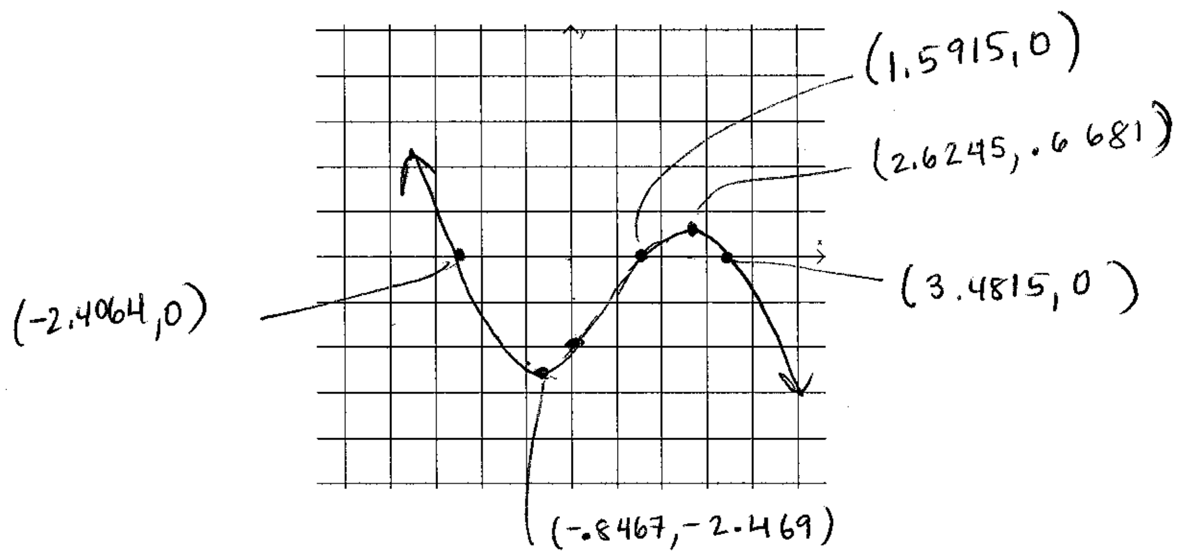
$x = 6$ or $x = 2$.

4. (6 points) Simplify and write in standard form: $(6+5i)(3-4i)$.

$$18-24i+15i-20i^2$$
$$= 18-9i+20$$
$$= \boxed{38-9i}$$

5. (12 points)

(a) Using your calculator, graph $f(x) = -.15x^3 + .4x^2 + x - 2$ over the following intervals: $-5 \le x \le 5$ and $-5 \le y \le 5$. Label intercepts and relative extrema.



(b) Find any relative maxima and minima, and explain which buttons you used on your calculator.

2nd + Calc + Max (or min)   rel. min: (-.8467, -2.469)

Left, Right, enter.   rel max: (2.6245, .6681)

6. (6 points) Find the zeros of the function $f(x) = x^2 - 15x$.

$$x^2-15x=0$$
$$x(x-15)=0$$
$$x=0,\ x=15$$

7. (6 points) Solve for x and check your answers: $\sqrt{5x-6} = x$.

Both $x=3$ and $x=2$ work.

$x^2 = 5x-6$

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

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

$x=3$ or $x=2$.

Check: $x=3$: $\sqrt{15-6} = \sqrt{9} = 3$ ✓

Check, $x=2$: $\sqrt{10-6} = \sqrt{4} = 2$ ✓

8. (8 points) Solve $5(6x-3) > 3(8x-9)$

$30x-15 > 24x-27$

$6x > -12$

$\boxed{x > -2}$

9. (8 points) State the quadratic formula, then use the quadratic formula to solve the following equation: $x^2+3x-7=0$. Leave answers in radical form.

$\frac{-b \pm \sqrt{b^2-4ac}}{2a}$, $\frac{-3 \pm \sqrt{9-4(1)(-7)}}{2(1)}$

$\boxed{\frac{-3 \pm \sqrt{37}}{2}}$

10. (8 points) A rectangular garden has a perimeter of 360 feet. If the width is one-fourth the length of the garden, find the **area** of the garden.

$2l + 2w = 360$, $w = \frac{1}{4}l$.

l = length
w = width

So, $4w = l$.

$8w + 2w = 360$

$10w = 360$

$w = 36$ ft. $l = 144$ ft.

Area: $5184\ ft^2$

11. ~~(10~~ 5 points) The function $s(t) = -16t^2 + 64t + 60$ gives the height of a ball, in feet, t seconds after it has been thrown.

Find $s(2)$ and label your answer.

$$s(2) = -16(2)^2 + 64(2) + 60$$

$$= -16(4) + 128 + 60$$

$$= -64 + 128 + 60$$

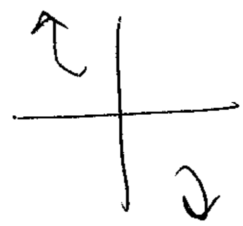
$$= \boxed{124 \text{ ft}}.$$

12. (8 points) Using the leading-term test, describe the end behavior of $p(x) = -3x^5 - 12x - 16$.

Since degree is odd and leading coefficient is negative,

as $x \to \infty$, $p(x) \to -\infty$

as $x \to -\infty$, $p(x) \to \infty$.



13. (8 points) Using **long division,** find the quotient and remainder:
$\dfrac{3x^3 - 2x^2 + 7x + 4}{x^2 + x + 1}$

$$\begin{array}{r} 3x - 5 \\ x^2+x+1 \overline{\smash{)}\, 3x^3 - 2x^2 + 7x + 4} \\ -(3x^3 + 3x^2 + 3x) \\ \hline -5x^2 + 4x + 4 \\ -(-5x^2 - 5x - 5) \\ \hline 9x + 9. \end{array}$$

Quotient: $3x-5$

Remainder: $9x+9$.