Name: Key
Recitation Instructor:
Recitation Day and Time:

College Algebra – Exam 1

September 16, 2008

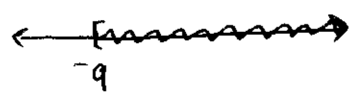
Page 1 26 pts.	Page 2 26 pts.	Page 3 24 pts.	Page 4 24 pts.	TOTAL 100 pts

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) Write in interval notation and then graph on a number line: $\{x \mid x \geq -9\}$

Interval Notation: $[-9, \infty)$

Number line:



2. (6 points) Multiply and display answer in standard form: $(a-5)(a^2+7)$

$(a-5)(a^2+7) = \boxed{a^3 - 5a^2 + 7a - 35}$

3. (8 points) Factor completely by grouping: $2x^3 + 6x^2 - 8x - 24$

$2x^2(x+3) - 8(x+3)$

$= (x+3)(2x^2 - 8)$

$= 2(x+3)(x^2-4) = \boxed{2(x+3)(x-2)(x+2)}$

4. (6 points) Factor into linear factors: $81y^2 - 25$

Difference of Squares: $\boxed{(9y-5)(9y+5)}$

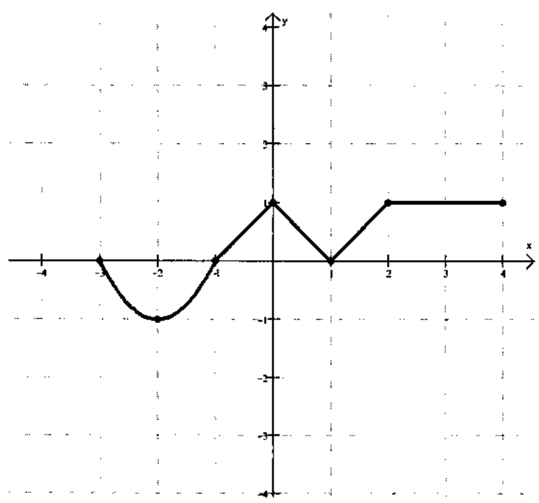
5. (6 points) Simplify completely: $(4x^3)^3(2x^{-4})^2$

$= (4^3 \cdot x^9)(2^2 \cdot x^{-8})$

$= (64x^9)(4x^{-8})$

$= \boxed{256x}$

6. (6 points) Determine the domain and range of the function whose entire graph is shown below:



Domain: $[-3, 4]$

Range: $[-1, 1]$.

7. (6 points) Simplify completely (no decimals allowed): $\sqrt{128xy^4}$

$\sqrt{128xy^4} = \sqrt{64 \cdot 2xy^4} = \boxed{8y^2\sqrt{2x}}$

8. (8 points) Find the least common denominator and simplify: $\dfrac{4}{x^2-9} + \dfrac{1}{x+3}$

LCD: x^2-9 or $(x-3)(x+3)$.

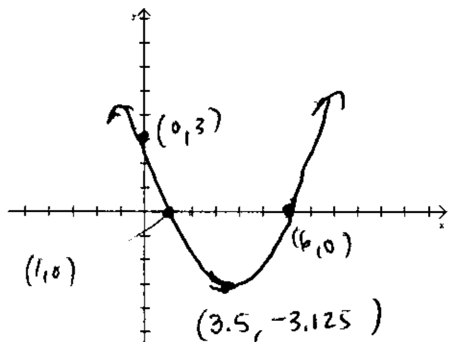
$$\frac{4}{x^2-9} + \frac{1}{x+3} = \frac{4 + 1(x-3)}{(x-3)(x+3)} = \frac{4+x-3}{(x+3)(x-3)} = \boxed{\frac{x+1}{(x-3)(x+3)}}$$

9. (6 points) Express in terms of a single radical (no decimals): $2\sqrt{125} - \sqrt{180}$

$$2\sqrt{125} - \sqrt{180} = 2\sqrt{25 \cdot 5} - \sqrt{36 \cdot 5}$$
$$= 10\sqrt{5} - 6\sqrt{5}$$
$$= \boxed{4\sqrt{5}}$$

10. (10 points)

(a) On the coordinate plane below, graph $f(x) = .5x^2 - 3.5x + 3$ over the following intervals: $-3 \leq x \leq 10$ and $-8 \leq y \leq 8$. Along with your graph, label all intercepts appropriately for full credit.



This point should be in the same neighborhood, roughly.

(b) Find the x-intercepts of this graph using your TI-83/84 and briefly explain which buttons you used. x-intercepts: (1,0) and (6,0).

2nd + Calculate menu (under Trace). Choose option 2. Click left bound; enter; right bound; enter; guess; enter. Repeat the process for the other zero.

11. (8 points) Our textbook considers an example in which the height (in centimeters) of an adult female with a humerus of length x, in centimeters, can be estimated by the function $H(x) = 2.75x + 71.48$. If a female's height is 160 cm, what is the length of her humerus, rounded to the nearest tenth?

$$160 = 2.75x + 71.48$$
$$-71.48 \qquad -71.48$$
$$88.52 = 2.75x$$
$$\boxed{32.2\text{cm} \approx x}$$

12. (10 points) Consider a circle with a diameter having endpoints at $(-4,3)$ and $(4,3)$:

(a) What is the center of the circle?

Midpt: $\left(\frac{-4+4}{2}, \frac{3+3}{2}\right) = \boxed{(0,3)}$

(b) What is the radius of the circle?

Distance from $(0,3)$ to $(4,3)$ is 4; $\boxed{\text{radius} = 4}$

(If they use the distance formula, that's fine)

(c) What is the equation of the circle in standard form?

$(x-h)^2 + (y-k)^2 = r^2$ $\boxed{x^2 + (y-3)^2 = 16}$

$(x-0)^2 + (y-3)^2 = 16$

13. (8 points) Given the points $(-4,5)$ and $(4,10)$, answer the following:

(a) What is the distance between the two points?

$d = \sqrt{(10-5)^2 + (4 - -4)^2}$

$= \sqrt{25+64} = \boxed{\sqrt{89}}$

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

$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{10-5}{4 - -4} = \boxed{\frac{5}{8}}$

14. (6 points) Evaluate and complete the following function table for $f(x) = x^3 + kx$, where k is some unspecified parameter.

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