Name:
Recitation Instructor:
Recitation Day and Time:

College Algebra – Exam 3

April 8, 2008

Page 1 22 pts.	Page 2 26 pts.	Page 3 30 pts.	Page 4 22 pts.	TOTAL 100 pts

Directions: You will find 13 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. (7 points) Solve and write your final answer in interval notation: $|2x - 3| > 7$

2. (8 points) Set up and solve an inequality to answer the following question. You must define any variables used. Firm A charges \$70 per hour for its services, while Firm B charges a fixed cost of \$200 plus \$50 per hour for the same services. For what length of time is it cheaper to hire firm A?

3. (7 points) Given $p(x) = 2x^4 + 3x^3 + 16x^2 + 27x - 18$, list all possible rational roots of $p(x)$. (You do not have to find the actual roots.)

4. (8 points) Find a polynomial with a single zero at $x = 1$ and at $x = 3$, and a double zero at $x = -2$. Write answer in the form $a_n x^n + \cdots + a_1 x + a_0$ (in other words, multiply out completely).

5. (10 points) Given the polynomial $p(x) = x^4 - 3x^3 + 11x^2 - 27x + 18$, and the fact that $x = 1$ and $x = 2$ are zeros,

   (a) Find all the zeros of $p(x)$.

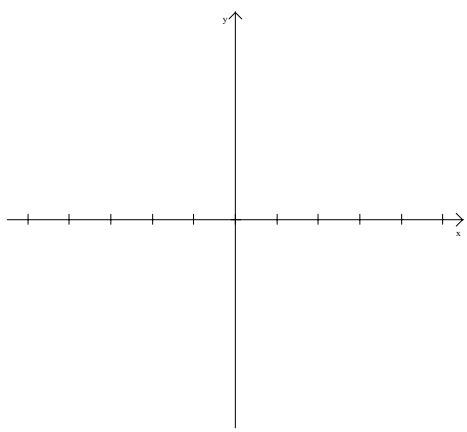
   (b) Factor the polynomial $p(x)$ completely. In other words, write $p(x)$ as a product of linear factors.

6. (8 points) Solve the inequality: $x^2 - 2x < 0$.

7. (6 points) Use the Remainder Theorem to find $f(-3)$ when $f(x) = 3x^3 - 2x + 1$.

8. (8 points) Using **long division,** find the quotient and remainder: $\dfrac{3x^3 + 2x + 5}{x + 1}$

9. (a) (5 points) Using your graphing calculator, graph $f(x) = x^4 - 9x^3 - 22x^2$ over the following intervals: $-5 \leq x \leq 5$ and $-50 \leq y \leq 50$. Label all intercepts and relative extrema.



(b) (5 points) What features of the graph of $f(x) = x^4 - 9x^3 - 22x^2$ are missing in this window? Explain.

10. (6 points) Find the inverse of the function $f(x) = x^3 - 7$.

11. (8 points) Consider the polynomial $p(x) = -x^4 + 5x^2 - 4$.

(a) What is the degree of $p(x)$?

(b) Using your graphing calculator, determine the exact number of turning points on the graph of $p(x)$.

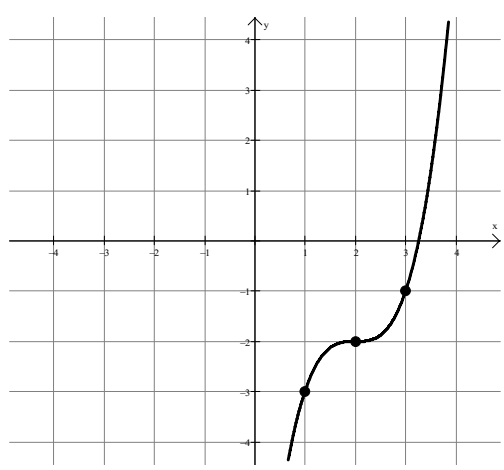
(c) Using the leading-term test, describe the end behavior of $p(x)$.

12. (8 points) Consider the rational function $r(x) = \dfrac{(2x+1)(x+1)}{x^2 - 6x + 8}$.

(a) Find the vertical asymptotes of $r(x)$.

(b) Find the horizontal asymptote of $r(x)$.

(c) Find the zeros of $r(x)$.

(d) Find the y-intercept of $r(x)$.

13. (6 points) Given the graph of $f(x)$ below, graph $f^{-1}(x)$ on the same set of axes.