MA 110 - 10/19/2005 SECOND MIDTERM (Practice Test)	FALL 2005 Alberto Corso	Name: _____

PLEASE, BE NEAT AND SHOW ALL YOUR WORK; CIRCLE YOUR ANSWER.

PROBLEM NUMBER	POSSIBLE POINTS	POINTS EARNED
1	6	
2	6	
3	6	
4	6	
5	6	
6	6	
7	6	
8	6	
9	6	
10	6	
TOTAL	**out of 50**	

1. Let $f(x) = \dfrac{x+2}{x-1}$ and $g(x) = \dfrac{x-5}{x+4}$

   (a) Find $(f \circ g)(x)$;

   (b) find $(g \circ f)(x)$.

pts: /6

2. (a) Find the equation of the parabola with a vertical axis that has vertex $V(3,-2)$ and passes through $P(5,4)$.

   (b) Express $f(x) = -2x^2 + 12x - 14$ in the form $a(x-h)^2 + k$. Graph $f(x)$.

pts: /6

3. Use the intermediate value theorem to show that $f(x) = 2x^4 + 3x - 2$ has a zero between $a = 1/2$ and $b = 3/4$.

pts: /6

4. Use synthetic division to find the quotient and the remainder if $f(x) = 6x^5 - 4x^2 + 8$ is divided by $p(x) = x + 2$.

pts: /6

5. Use Descartes rule of signs to find the number of possible positive, negative, and non-real complex solutions of the equation

$$x^5 - 4x^3 + 6x^2 + x + 4 = 0.$$

pts: /6

6. Find the zeros of $f(x) = (x^2 - 2x + 1)^2(x^2 + 2x - 3)$, and state the multiplicity of each zero.

pts: /6

7. Show that the equation

$$2x^5 + 3x^3 + 7 = 0$$

has no rational root.

pts: /6

8. Find an equation of a rational function $f(x)$ that has:
vertical asymptotes at $x = -2$ and $x = 0$;
horizontal asymptote $y = 0$
x-intercept 2;
$f(3) = 1$.

pts: /6

9. Sketch the graph of

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

pts: /6

10. Suppose 200 trout are caught, tagged, and released in a lake's general population. Let T denote the number of tagged fish that are recaptured when a sample of n trout are caught at a later date. The validity of the mark-recapture method for estimating the lake's total trout population is based on the observation that T is directly proportional to n. If 10 tagged trout are recovered from a sample of 300, estimate the total trout population of the lake.

pts: /6