MATH 151 **EXAM IIA** NAME_____

Mrs. Bonny Tighe 3.9-4.9

100 points SECTION _____ Mon. 4/10/06

There are 11problems worth 10 points each.

1. Find the absolute and local maximum and minimum values of the function f(x) on the given interval. $f(x) = 3 + \sin 2x \ [0, \pi/6]$

2. Find the limits:

a) $\lim_{x\to-\infty} \frac{2x-3}{4-x^2}$ _____

b) $\lim_{x\to\infty} (2x - \sqrt{4x^2+5}) =$_____

c) $\lim_{x\to\infty} \frac{\sqrt{4x^2+3x-1}}{5x+3} =$ _____

d) $\lim_{x\to-\infty} (2-x)^3(3x+1)(2x-3) =$ _____

3. Find the vertical and horizontal asymptotes as well as the x- and y-intercepts:

a) $f(x)=\dfrac{x^3-x}{4-x^2}$

b) $f(x)=\dfrac{x+1}{x^2-4x+3}$

4. Find the equation of the tangent line to $y = 2-\cos^3 3x$ at $(\pi/6, 2)$

5. Use Linear Approximation, or differentials, to estimate the value of $\sin 61^0$

6. A conical tank is 10 feet high and has a radius of 5 feet. If the tank is being filled with water and the water level is rising at a rate of 4 ft/min., how fast is the water being pumped into the tank when the water is 18 inches deep? $V = \frac{1}{3}\pi r^2 h$

7. Find the intervals of increasing and decreasing using the first derivative test. Find the intervals of concave up and concave down using the second derivative test. Find the intercepts and graph.

$f(x) = 2x^3 - 3x^2 - 12x + 18$

8. Verify the hypotheses of the Mean Value Theorem and find all numbers c that satisfy the conclusion.

$f(x) = (4-x)\sqrt{x+1}$, $[-1, 4]$

9. Show that the equation $x^3 + 15x + 4 = 0$ has at most one root.

10. Use Newton's Method to approximate $\sqrt[3]{50}$

11. If 1200 cm^2 of material is available to construct a box with a square base and an open top, find the largest possible volume of the box.