MAT 200 NAME:
Franklin College, Spring 2006
Dr. Prisner

Midterm Exam

There are 29 possible points in 8 questions.

This midterm is, as all our tests and quizzes, a closed-book-and-notes exam. Please note that MathCad and calculators, are allowed, but notebooks, organizers, palm computers, cell phone, ... everything where you can store text, is **not allowed.**

Please show all your work. GOOD LUCK!

1) (8 points) Differentiate (MATHCAD is banned for this one question).

a) $f(x) = 2x^4 - 3x^2 + 4x - 1$

b) $f(x) = \frac{2}{x^2} + 3\sqrt{x}$

c) $f(x) = (x^4 - 3x + 7)(x^3 - 3x + 2)$

d) $f(x) = (x^3 - 5x^2 + 2)\sqrt{x^4 + 2x^2 + 8}$

e) $f(x) = \sqrt{\frac{x-2}{x+3}}$

2) (3 points) For the function $f(x) = \frac{x^2-4}{x-2}$, find $f'(x)$, $f'(1)$, and $f''(1)$.

3) (3 points) Below, the graph of the function f is given. Estimate $f(2), f'(2)$, and $f'(0)$. Also tell for which values of x the derivative f' is negative.

4) (4 points) Below the graph of the equation

$$x^2 + x^2y + y^3 = 9$$

is displayed. Draw the tangent for the curve at the point $(2, 1)$, and use implicit differentiation to find the slope of that tangent line.

5) (3 points)

a) What does it mean a function f is continuous at $x = 2$?

b) Is $f'(x)$ the tangent line of the function f? Explain.

c) True or false: A function f is differentiable at a if $\lim_{h\to a} \frac{f(a+h)-f(a)}{h}$ exists.

6) (2 points) Find whether the following limits exist or not. If they exist, compute their value.

a) $\lim_{x\to 1} \frac{x-1}{x-2} =$

b) a) $\lim_{x\to 2} \frac{x^2-4}{x-2} =$

7) (3 points) The altitude of a triangle is increasing at a rate of 1 cm/min while the area of trinagle is increasing at a rate of 2 square centimeter/min. At what rate is the base of the triangle changing when the altitude is 10 cm and the area is 100 square centimeter?

8) (3 points) Find the equation of the straight line that is tangent to the graph of the function $f(x) = (3x^2 + 1)^3$ at $x = -1$.