MATH 120 MIDTERM 2 INFORMATION

The midterm will cover Sections 2.5-2.6, 2.8-2.11, 3.1-3.6, and 4.1-4.3 of the textbook. There will be 4-5 problems whose level of difficulty will be comparable to that of the practice problems below. You will be allowed to have one letter-sized, one-sided formula sheet. No other aids (books, notes, calculators, etc.) will be allowed.

There will be no homework on Sections 4.1-4.3 before the test. Recommended practice problems are: Section 4.1, 1-41; Section 4.2, 1-50; Section 4.3, 1-36.

PRACTICE PROBLEMS

1. With full brakes applied, a car can decelerate at a constant rate of 8 m/s^2. How fast can the car travel if its braking distance (from full speed to a complete stop) is not to exceed 60 m?

2. Solve the initial value problem $y'(x) = \dfrac{1}{2+2x+x^2}$, $y(0) = 1$.

3. Let $f(x)$ and $g(x)$ be two differentiable functions, defined on some open interval including $x = 1$, such that

$$e^{f(x)} + 4f(x)(g(x))^2 + x^2(g(x))^3 - 3(g(x))^4 = 0$$

   and $f(1) = 0, g(1) = 2, f'(1) = -1$. Find $g'(1)$.

4. Find all x such that $\sin^{-1}(\cos x) = x$.

5. A hiker is climbing a hill at an angle of 30 degrees to the ground and maintains a speed of 2 miles per hour. Another hiker is walking along a level trail in the opposite direction at 4 miles per hour. Both hikers left the junction at the bottom of the hill at 12 noon. How fast does the distance d between the two hikers increase at 1 PM?

6. Find all local maxima and minima of the function $f(x) = \frac{1}{3}e^{3x} - 2e^{2x} + 3e^x$.