REVIEW FOR FINAL EXAM; MAT 131 (SPRING, 08)

(1) Set $f(x) = e^{2x} + 2sin(x)$.

(a) Compute the derivative $f'(x)$.
(b) Find an equation for the tangent line to the graph of $f(x)$ when $x = 0$.
(c) Use the "tangent line approximation" to $f(x)$ at $x = 0$ to approximate the value $f(\frac{1}{10})$.

(2) Compute the first derivate of $f(x) = 2^x log_3(tan(x))$.

(3) Set $f(x) = 3x - ln(x)$.

(a) Find all the critical numbers for $f(x)$.
(b) Does a local maximum value occur at any of these critical numbers?
(c) Find the maximum and minimum values for $f(x)$ on the interval $[\frac{1}{5}, 4]$.

(4) Compute the following limits.

(a) $limit_{x\to 1}\frac{ln(x)}{sin(\pi x)}$.
(b) $limit_{x\to -2}\frac{e^{x+2}-1}{(x^2-4)}$.

(5) #12 on page 311 and #17 on page 321.

(6) Find all possible functions $y = y(x)$ which satisfy $\frac{d^2y}{dx^2} = sin(x)$. (Hint: first solve for $\frac{dy}{dx}$ — it is an antiderivative for sin(x).)

(7) Compute the following definite integrals.

(a) $\int_{\pi}^{2\pi} cos(2x + \pi/2)dx$
(b) $\int_1^2 (\frac{1}{x+2} + \frac{-2}{(x+1)^2}dx$

(8) Compute the following indefinite integrals.

(a) $\int sec^2(x)dx$
(b) $\int (3x^{\frac{1}{2}} - 7x^{-99} + 2^x)dx$
(c) $\int (cos(x) - sin(x))dx$

(9) Define a function $f(x)$ as follows: $f(x) = sin(x)$ if $x \leq \pi/4$; $f(x) = cos(x)$ if $x \geq \pi/4$.

(a) Explain why $f(x)$ is continuous.
(b) Does $f(x)$ have a derivative at $x = \pi/4$?
(c) Compute the definite integral $\int_{-\pi}^{\pi/2} f(x)dx$.

(10) Use Newton's method to approximate $(\frac{1}{2})^{\frac{1}{3}}$ to one decimal place.

(11) #42 on page 333.

(12) #17,18 on page 384.

(13) #14,20 on page 392.