Practice test for exam #2 in MA135

In addition to problems on this sheet, students should study webwork problems, assigned homework, worked examples in the text, review problems at the end of each chapter, and Prof Sims' and Greenfield's sample exams on the web.

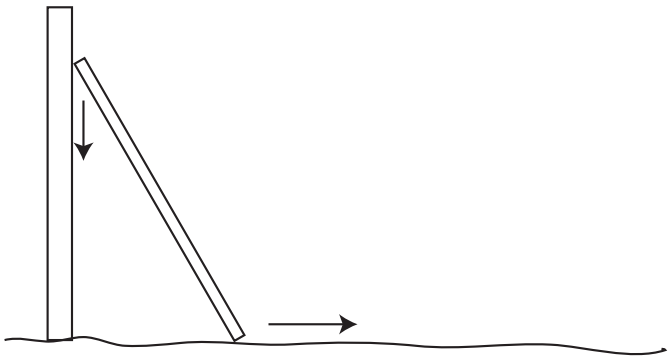
1a. Let $f(x) = e^{-x^2+3}$. Find $f'(x)$.

1b. Let $f(3) = 1,\ g(2) = 3,\ f'(3) = 4,\ g'(2) = 5$. If $h(x) = f(g(x))$, find $h'(2)$.

2a. Find the equation of the tangent line to the graph of $x^3 + y^3 = y + 21$ at $(3, -2)$

2b. If $y = x^{(x^2)}$, find $\dfrac{dy}{dx}$

3a. A ladder of length 5m is resting against a vertical wall. If the ladder slides down the wall, how fast is the top end of the ladder moving when the bottom is 3m from the wall and moving away from the wall at 2m/s?



3b. One end of a rope is fastened to a boat and the other end is wound around a windlass located on a dock at a point 4 m above the level of the boat. If the boat is drifting away from the dock at the rate of 2 m/min, how fast is the rope unwinding at the instant when the length of the rope is 5 m?

4a. Use differentials to approximate $\sqrt{103}$.

4b. Find $d(x^2 \sin x^3)$.

5a. Find the absolute max and min of $f(x) = x^5 - x^4$ on $[-1, 1]$.

5b. Find the absolute max and min of

$$f(x) = \begin{cases} 9 - 4x & \text{if } x < 1 \\ -x^2 + 6x & \text{if } x \geq 1 \end{cases}$$

on $[0, 4]$.

6. If $f(x) = \dfrac{1}{\sqrt{x}}$, find the c in the Mean Value Theorem if $a = 1$ and $b = 4$.

7. An efficiency study of the morning shift at a factory indicates that the number of units produced by an average worker t hours after 8:00 AM is modeled by the formula

$$Q(t) = -t^3 + 9t^2 + 12t.$$

At what time in the morning is the worker performing most efficiently?

8.

8a. Sketch the graph of $g(u) = u^4 + 6u^3 - 24u^2 + 26$.

8b. Sketch the graph of $f(x) = \dfrac{3x - 5}{x - 2}$.

8c. Find $\lim\limits_{x \to \infty} \left(1 + \dfrac{1}{2x}\right)^{3x}$.

8d. Find $\lim\limits_{x \to 0^+} \left(\dfrac{2\cos x}{\sin 2x} - \dfrac{1}{x}\right)$.

9. Evaluate $\lim\limits_{x \to 0} \dfrac{1 - \cos x}{\sec x}$.

10. Don't forget to review the webworks problems!!!