

## CALCULUS I TEST II REVIEW (VERSION A)

These are questions that I believe to be important. Treat this like a test, don't use your notes, and see how you do. If you can't do any part of this, go to the corresponding section and find problems like the ones you cannot do.

1. Find the absolute extrema  $f(x) = x - 12x^{1/3}$  on the interval  $-27 \leq x \leq 1$ .
2. Find all intervals of increasing, decreasing, concave up, concave down, relative extrema, and points of inflection of the function  $f(x) = \sin \theta + \sqrt{3} \cos \theta$  on the interval  $0 \leq x \leq 2\pi$ . Give reasons for your conclusions.
3. Farmer Joe wants to make his back yard purty. So he decides to make a flower garden in his back yard. Joe has a big guard dog that gets into everything, so he decides he wants an electric fence to keep Rex out. He finds out the fencing is expensive and he can only afford 172 ft of it. To maximize the area of the garden, he decides plant the flowers to where one side of the garden is adjacent to the house and doesn't need fencing. He decides that he must have at least 3 feet of walkway around the garden so he can get around. What is the maximal area of the garden and what are its dimensions?

4. A student standing 50 ft from his Calculus teacher has a water balloon launcher in his hand. The student is at an angle of elevation to the teacher of 60 degrees. The allowable error in height between you and your target is about  $\pm 2$  ft, what is the maximal allowable error in the angle measurement in order for the student to exact revenge?

6. Apply Rolle's Theorem and the Mean Value Theorem to the following functions if applicable. If not applicable, state the reason why.

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|-------------------------|------------------|
| a) $f(x) = x^2 - 2x$    | $[0, 2]$         |
| b) $f(x) = x^{2/3} - 1$ | $[-8, 8]$        |
| c) $f(x) = \sin 2x$     | $[\pi/6, \pi/3]$ |
| d) $f(x) = \sec x$      | $[0, \pi]$       |

7. Calculate the following integrals:

- a)  $\int x^2 - 2x + \frac{2}{x^3} - \sqrt[3]{x^2} dx$
- b)  $\int \frac{x^2 - 1}{x^2} dx$
- c)  $\int \theta^2 + \sec^2 \theta d\theta$
- d)  $\int (3x + 1)(2x - 1) dx$

**THIS IS A TYPICAL TEST. MAKE SURE YOU CAN DO THIS IN ONE HOUR... AND GOOD LUCK!☺!**