Review Problems

October 28, 2016

- 1. (Fall 2010, Exam 3, #1) A tank has the shape of an inverted circular cone with radius 2 m and height 8 m. If water is pouring into the tank at a rate of 4 m³ per minute, find the rate at which the water level is rising (in m per minute) when the water is 4 m deep.
- 2. (Fall 2003, Exam 3, #9) Suppose that f is continuous on [2,5] and $2 \le f'(x) \le 5$ for all x in (2,5). Find the interval the mean value theorem implies that f(5) f(2) lies in.
- 3. (Fall 2005, Exam 3, #14) Given that f(1) = 9 and $f'(x) \ge 3$ for $1 \le x \le 4$, find the smallest value that f(4) can be.
- 4. (Fall 2008, Exam 3, #5) Given that f(3) = 0 and $f'(x) \ge 3$ for $0 \le x \le 3$, find the largest f(0) can be.
- 5. (Fall 2009, Exam 3, #8) If f(x) is continuous on [5,7] and differentiable on (5,7) and its derivative satisfies $3 \ge f'(x) > 2$ for every x in the interval (5,7), we can conclude that f(7) f(5) is in the following interval:
 - (a) (4, 6)
 - (b) (3,7)
 - (c) (4, 6]
 - (d) [3,7]
 - (e) (0,1]
- 6. (Fall 2010, Exam 3, #3) If $f(x) = x^3 + x 1$ on the interval [0, 2], find a number c that satisfies the Mean Value Theorem.