Math 1271 - Lectures 010 and 030 **Name (Print):** _____
Fall 2017
Midterm 2 - A
11/09/17
Time Limit: 50 Minutes Section _____

You may *not* use your books, notes, graphing calculator, phones or any other internet devices on this exam. Please show all work clearly and legibly.

Problem	Points	Score
1	15	
2	15	
3	20	
4	15	
5	20	
6	15	
Total:	100	

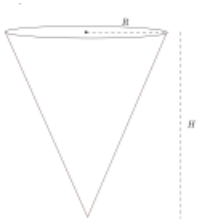
1. (15 points) Consider the equation $y = \sqrt{x-2}$
   (a) Compute Δy and $\mathrm{d}y$ at $x_0 = 3$ and $\mathrm{d}x = \Delta x = 0.02$.
   (b) Use the previous part to compute an approximation to the number $\sqrt{1.02}$.

2. (15 points) A water tank has the shape of an inverted circular cone with base-radius $R = 3$m and height $H = 9$m. If water is being pumped into the tank at a rate of 3 m^3/min find:

   (a) the rate at which the water level is rising when the water is 6m deep.

   (b) the rate at which the radius of the water level is increasing when the water is 6m deep.

   Hint: The volume V of a cone with radius r and height h is $V = \frac{1}{3}\pi r^2 h$.



3. (20 points) (a) State the definitions of critical and inflection numbers (or points).

(b) State the first and second derivative tests

(c) Consider the function $f(x) = \ln(x^2 + 4)$.

(i) Find the intervals of increase and decrease for $f(x)$.

(ii) Find the critical points of $f(x)$ and identify any local minima or maxima.

(iii) Find the intervals of concavity.

(iv) Find the inflection points of f.

4. (15 points) If 200 cm^2 of material is available to make a closed box with a square base, find the largest possible volume.

5. (20 points) Compute the value of the following limits:

(a)

$$\lim_{x\to\infty} x^2 e^{-x^2}$$

(b)

$$\lim_{x\to\infty} x^{1/x}$$

6. (15 points) Find $f(t)$ where

$$f''(t) = \sqrt{t} - \sin(t),\ f(0) = 1,\ f'(0) = -1$$