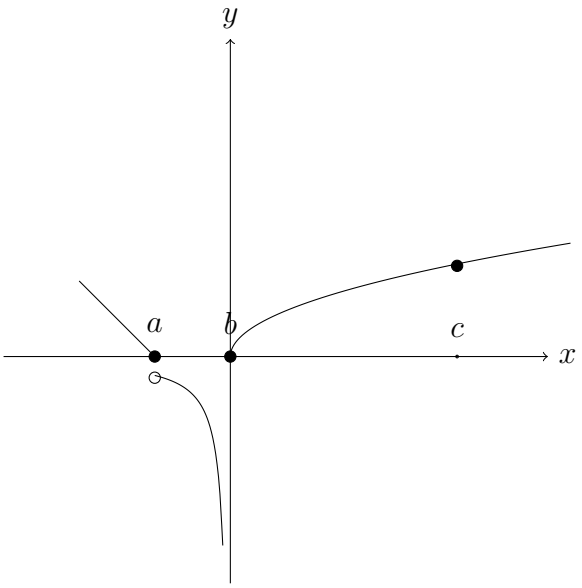
MATH 220, Final Exam

Name:_____ Date: 07/31/15

You have the entire class time. If you don't understand a question, ask me about it. Good luck!

1. (15pts) Below is a graph of $f(x)$.



Fill in the blank with the limit. If the limit does not exist write "DNE".

(a) $\lim_{x\to b^-} f(x)$=_____.

(b) $\lim_{x\to a} f(x)$=_____.

(c) $\lim_{x\to c} f(x)$=_____.

Indicate the type of discontinutity for each of the points above. If it's not a discontinuity, then write "cts".

a:_____

b:_____

c:_____

2. (20pts) Find the derivatives of the following functions.
(a)$f(x) = 5x^2 + 2x + e^2$

(b)$f(x) = 5(2x + 1)^{1/3}$

(c)$f(x) = (3x + 1)e^{2x}$

(d)$g(x) = \frac{(2x)3^x}{\sin(x)7^x}$

3. (20pts) Fill in the blanks for the function $f(x) = x^3 - 3x + 1$ over [-2,3]. Write DNE if it doesn't exist.

Critical Points:_____ Inflection Points:_____
Local Minimum:_____ Local Maximum:_____
Absolute Minimum:_____ Absolute Maximum:_____

4. (20pts) A 3 meter ladder is leaning against a wall. The ladder then begins to slide. The bottom of the ladder is sliding away from the wall at a rate of .2m/s. How fast is the top of the ladder sliding when the top of the ladder is 2 meters away from the ground?

5. (20 pts) You are designing a cylindrical drum that needs to hold a volume of 32 cm^3. What are the dimensions of the cylinder that minimize the amount of material used?

   Top/Bottom Radius:_____cm
   Height:_____cm

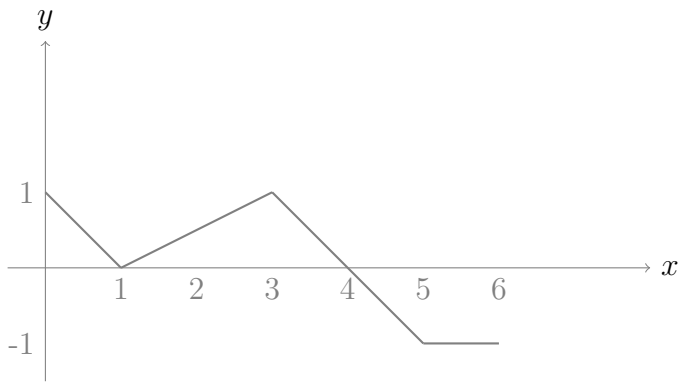
6. (20pts) Compute the following integrals.
(a) $\int (2x^3 + 5x + e^{2x+1})dx$

(b) $\int (6x + 1)^5 dx$

(c) $\int (\frac{2x}{1+x^4})dx$

(d) $\int_0^1 (xe^{x^2})dx$

7. (15pts) Use the graph of $f(x)$ to answer the following questions.



(a) Compute $\int_3^4 f(x)dx$

(b) Compute $\int_0^6 f(x)dx$

(c) Compute $\int_3^1 f(x)dx$

8. (20 pts) Derive the volume formula for a solid cone with a base radius of r and a height of h.

   Cone Volume = _____