

## Practice Final

**Name:** \_\_\_\_\_

**StudentID:** \_\_\_\_\_

**Major:** \_\_\_\_\_

**Time:** 120 minutes.

**Date:** Tuesday, 26<sup>th</sup> April 2011.

Justify your solutions and show all your steps. Write down the formulae used.

Number	1	2	3	4	5	6	7	8	9	10	$\Sigma$
Possible Points	8	8	8	8	8	8	8	8	8	8	80
Points											

1. Find each limit if it exists:

(a)  $\lim_{x \rightarrow 2} \frac{x^2 - 8}{x - 2}$

(b)  $\lim_{x \rightarrow 2} \frac{4x^3 - 8x^2}{4x^3 - 16x}$

2. Is the following function continuous. Justify.

$$y = \begin{cases} x + 2 & \text{if } x \leq 2 \\ 5x - 6 & \text{if } x > 2 \end{cases}$$

3. (a) Define the derivative for a continuous function.  
(b) What is the Fundamental Theorem of Calculus?

4. Find the fifth derivative of  $f(x) = \frac{(1-x)^6}{24}$ .

5. Find any relative maxima, minima, zeros, points of inflection and sketch the graph. Hint:  $\sqrt{\frac{5}{3}} \approx 1.3$ ,  $\sqrt{\frac{1}{2}} \approx 0.7$ .

$$y = 5x^3 - 3x^5$$

6. Evaluate the integrals

(a)  $\int x e^{1+x^2} dx$

(b)  $\int (x^2 - 1)^{-2/3} x dx$

(c)  $\int \frac{3x}{x^2-1} dx$

7. (a) Find the general solution for the differential equation

$$tdy = \frac{dt}{y+1}$$

- (b) Find the particular solution for

$$y' = \frac{2x}{1+2y} \quad ; \quad y(2) = 0.$$

8. Find the area under the graph of  $y = 3x^2$  from  $x = 0$  to  $x = 1$ .

9. Evaluate the integrals:

(a)  $\int_1^3 \sqrt{x^2 + 9} dx + \int_3^1 \sqrt{x^2 + 9} dx$

(b)  $\int x^5 \ln x dx$

(c)  $\int_{-\infty}^0 \frac{x dx}{(x^2+1)^2}$

10. Find all third partial derivatives for the function

$$z = x^3 + y^3 + x^2y^2 + e^{xy}$$

How many derivatives will you have to calculate?