

## Topics for Calculus BC Fall Final Exam

### 1) ~~Solving Differential Equations~~

Separable: ~~y's with dy's and x's with dx's~~

### 2) Indeterminate forms and knowing how to apply L'Hopital's Rule Transforming indeterminate forms into rational expressions to apply L'Hopital's

$$\text{Rule: } \lim_{x \rightarrow a} \frac{f(x)}{g(x)} = \lim_{x \rightarrow a} \frac{f'(x)}{g'(x)} \quad \text{or} \quad \lim_{x \rightarrow \pm\infty} \frac{f(x)}{g(x)} = \lim_{x \rightarrow \pm\infty} \frac{f'(x)}{g'(x)}$$

### 3) Improper Integrals

- f. Remember earlier techniques of integration including separation of variables.
- g. Know where to use the dummy variable

### 4) Integration by Partial Fractions

- a. Know when to use a linear term in the numerator

$$\frac{A}{x+d} + \frac{Bx+C}{ax^2+bx+c} \quad \text{where } ax^2+bx+c \text{ is a factored quadratic.}$$

- b. Know when to use more than one term for a perfect square, cube, etc.

$$\frac{A}{x} + \frac{B}{x^2}, \text{ etc.}$$

### 5) Testing Series

- a) Both comparison tests
- b) The Integral Test
- c) Ratio and Root tests
- d) Alternating Series Test
- e) Testing for Absolute or Conditional Convergence

### 6) Power Series

- a) Finding radius of convergence
- b) Finding the interval of convergence

c) Testing the endpoints

7) Taylor and MacClaurin Series

Generating a Taylor or MacClaurin Series using the general formula.

$$\sum_{n=0}^{\infty} \frac{f^n(a)}{n!} (x-a)^n$$

8) Error bounds

a) Alternating Series Error

b) La Grange Error bound for a polynomial of degree  $n$

$$\frac{f^{n+1}(c)}{(n+1)!} (x-a)^{n+1} \quad \text{where } c \text{ is a number between } x \text{ and } a.$$

For the last time in this class, a cheat sheet is allowed. The sheet can be 8 ½ by 11 front and back. It must have your name on it, be in your handwriting only and is to be turned in with the test. Calculators are allowed but if you are instructed to solve a problem analytically, your calculator should not be used and your work must be shown.