Math 1522: Student Learning Outcomes

1. Know the definitions, graphs, special values, derivatives and integrals (when possible) of transcendental functions, including exponential, logarithmic, inverse trigonometric and hyperbolic functions.

2. Use the methods of substitution, integration by parts, partial fractions and trigonometric substitution to compute proper and improper integrals. Evaluate improper integrals using correct mathematical limit notation.

3. Use rectangles or trapezoids to approximate integrals.

4. Solve separable differential equations. Plot direction fields and solution curves. Find equilibrium solutions.

5. State the definition of the value of a series, as well as necessary conditions for convergence. Use the definition to determine the value of a series. Determine the value of known Taylor series at particular points. State various tests for convergence, including all conditions, and apply them. Approximate alternating series and estimate the error.

6. Determine the asymptotic behavior of functions $f(x)$ as $x \to \pm\infty$ and the limit of indeterminate forms.

7. State the definition of the Taylor series of a function and describe its properties. Find Taylor series using the definition, or by substitution into, or differentiation or integration of known series, and determine their interval/radius of convergence. Approximate functions by Taylor polynomials within the interval of convergence and estimate the error. Include approximations of definite integrals or quantities depending on parameters, such as arise in applications in physics, chemistry, biology and engineering.

8. Use Taylor series to derive Euler's formula for the exponential of a complex number. Evaluate sums, products, powers, roots, and exponentials of complex numbers. Evaluate integrals of complex functions.