Math 252: Integral Calculus (4-0-4) 05/14/18

Catalog Description: Computational techniques for and applications of the de nite and in-de nite integrals.

Course Objectives: After completing this course, students will be able to

1. Evaluate inde nite and de nite integrals.
2. Use de nite integrals to solve application problems.
3. Use various integration techniques to evaluate integrals.
4. Communicate mathematical ideas using correct and appropriate notation.

Learning Outcomes and Performance Criteria

1. Apply mathematical concepts and principles to perform computations.
   Core Criteria:
   (a) Compute the anti-derivative of a basic form (linear combinations of x^n for any rational n, $\sin(kx)$, $\cos(kx)$ and e^{kx}) without use of formulas.
   (b) Compute an anti-derivative like those in (a) but which requires a step of algebraic manipulation prior to integration.
   (c) Compute an anti-derivative using u-substitution.
   (d) Compute an anti-derivative using integration by parts.
   (e) Compute an anti-derivative using partial fractions, for a quadratic denominator without repeated linear factors.
   (f) Compute an anti-derivative requiring one substitution with a trigonometric identity.
   (g) Using trigonometric substitution, evaluate an integral containing one of the forms $a^2 + x^2$, $a^2 \quad x^2$, $x^2 \quad a^2$.
   (h) Given an integral, determine an appropriate method of integration.
   (i) Use a given initial value to nd the constant of integration.
2. Understand the theory of de nite integrals.
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Additional Criteria:

(d) Apply properties of de nite integrals to evaluate integrals of arbitrary functions with given de nite integrals.

(e) Express a de nite integral as a limit of sums or vice-versa.

(f) Compute a de nite integral using a limit of sums.

(g) Use the Fundamental Theorem of Calculus to di erentiate an integral of the form $\int_{g(x)}^{h(x)} f(t)\,dt$.

3. Compute de nite integrals; use de nite integrals to solve applied problems.

Core Criteria: