Math 1297 – Exam I – Review Topics

Chapter 7
Integration
  Trigonometric integrals
  Trigonometric Substitution
  Partial Fraction Decomposition
  Using Tables
  Numerical Integration
  Improper Integral

Chapter 8
Applications of Integration
  Arc Length
  Area of a surface of revolution
  Hydrostatic Force
  Centroid
Math 1297 – Spring 2014 - Exam 10 points each unless noted otherwise.

1. \[ \int \frac{3x^2 + x + 2}{x^3 + x} \, dx \]

2. \[ \int \cos^4 x \sin^3 x \, dx \] using the property \( \cos^2 x + \sin^2 x = 1 \)

3. \[ \int \frac{x^2}{\sqrt{1-x^2}} \, dx \] using the property \( \cos^2 x + \sin^2 x = 1 \)

4. \[ \int \frac{\cos x}{\sin x \sqrt{1 + 2 \sin x}} \, dx \]
5. \[ \int \frac{6x + 3}{\sqrt{3x - 5}} \, dx \]

6. Determine if the integral converges or diverges. \[ \int_{0}^{\infty} xe^{-x^2} \, dx \]

7. A large tank is designed with ends in the shape of the region between the curves \( y = \frac{x^2}{2} \) and \( y = 12 \), measured in feet. Find the hydrostatic force on one end of the tank if it is filled to a depth of 10 feet with water. (Weight density, \( \delta \), of water 62.5 lb/ft\(^3\))
8. Set up (DO NOT EVALUATE) the integral needed to compute the surface area of the solid generated by revolving the curve $y = x^2$ from $0 \leq x \leq 1$ about the y-axis.

9. Find the centroid of the region bounded by the curve $y = 4 - x^2$ and the x-axis.

10. Compute the maximal error when the trapezoidal rule, with $n = 30$, is used to approximate $\int_{0}^{3} e^{2x} \, dx$. 