MATH 1710 - Homework 9

Due 11/16

Directions: Write legibly and show all your work. Please staple your pages together.

1. Find the following indefinite integrals.

   (a) $\displaystyle\int \left(\frac{1}{5} - \frac{2}{x^3} + 2x\right) dx$

   (b) $\displaystyle\int \frac{t\sqrt{t} + \sqrt{t}}{t^2} dt$

   (c) $\displaystyle\int \left(\sin 2\theta - \sec^2 5\theta\right) d\theta$

   (d) $\displaystyle\int \cos^2 x \; dx$ (*Hint:* Use the identity $\cos^2 x = \frac{1}{2} + \frac{1}{2}\cos 2x$)

2. Find constants a and b so that $F(x) = ax\cos x + b\sin x$ is an antiderivative of $f(x) = x\sin x$. (*Hint:* What does it mean for F to be an antiderivative of f?).

3. A car traveling at 25 m/s begins (at $t = 0$) to slow down at a constant rate of 4 m/s^2. How long does it take for the car to come to a stop and how far will the car have traveled during this time?

4. Let $f(x) = 2x + 3$.

   (a) Compute the left Riemann sum for f on $[0, 3]$ using $n = 6$ rectangles of equal width.

   (b) Compute the right Riemann sum for f on $[0, 3]$ using $n = 6$ rectangles of equal width.

   (c) Find the exact area of under the graph of f on $[0, 3]$ using elementary geometry and compare with your prior estimates.