Mathematic 108, Fall 2015: Assignment #10

Due: **In your assigned section, either Tues., Dec. 1st or Thurs., Dec. 3rd**

Instructions: Please ensure your name, your TA's name and your section number appear on the first page. Also that your answers are legible and all pages are stapled. Page numbers refer to the course text.

Problem #1. Evaluate the following indefinite integrals and then check your work by differentiating

a) $\int \sqrt{t}(t^2 - t - 1)dt$.
b) $\int 1 - \tan^2(\theta) + \cos(\theta)d\theta$.
c) $\int 2^x(3^{-x} + 3^x)dx$.

Problem #2. Suppose the velocity of a particle is $v(t) = t^2 - 2t - 3$

a) Determine the total displacement of the particle from $t = 1$ to $t = 4$.
b) Determine the total distance the particle travels from $t = 1$ to $t = 4$.

Problem #3. Evaluate the following definite integrals

a) $\int_0^2 \frac{1}{3x+2}dx$.
b) $\int_{-1}^2 xe^{-x^2}dx$.
c) $\int_0^2 \frac{x}{\sqrt{1+4x}}dx$.

Problem #4. Evaluate the following indefinite integrals

a) $\int \sin(2\theta)\sqrt{1 + \cos(2\theta)}d\theta$.
b) $\int \frac{x}{1+x^4}dx$.
c) $\int \frac{(\ln(x))^3}{x}dx$.

Problem #5. If $\int_1^5 f(x)dx = -3$, then determine $\int_1^3 f(2x - 1)dx$.

Problem #6. If f is continuous on $[-1, 1]$, determine $\int_{-1}^1 xf(x^2)dx$.

Problem #7. If f is continuous on $[0, \pi]$ use the substitution $u = \pi - x$ to show that

$$\int_0^\pi xf(\sin(x))dx = \frac{\pi}{2}\int_0^\pi f(\sin(x))dx.$$

Problem #8. Sketch the regions enclosed by the given curves and find their area

a) $y = \cos(x), y = 2 - \cos(x), 0 \leq x \leq 2\pi$.
b) $y = x^3, y = x$.

Problem #9. Find the area of the region bounded by the parabola $y = x^2$, the tangent line to this parabola at $(1, 1)$ and the x-axis.

Problem #10. For what value c is the region between $y = c^2 - x^2$ and $y = x^2 - c^2$ equal to 576

Book Problems.

a) Section 5.4: #6, #16, # 44
b) Section 5.5: #16, #18, #64, #66, #86
c) Section 6.1: #2, #8