Mathematic 108, Fall 2015: Assignment #8

Due: **In your assigned section, either Tues., Nov. 3rd or Thurs., Nov. 5th**

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. Determine the minimum vertical distance between the parabolas $y = 2x^2 + 3$ and $y = -x^2 + 2x$.

Problem #2. Determine the point on the curve $y = 2\sqrt{x}$ that is closest to the point $(12, 0)$.

Problem #3. A piece of wire of length $20m$ is cut into two pieces. One piece is bent into a square and the other into a circle. How should the wire be cut so total area enclosed is

a) Maximal.
b) Minimal.

Problem #4. Find the area of the largest rectangle that can be inscribed in the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$.

Problem #5. Find the most general form of the antiderivative of the given functions and check your answer by differentiating.

a) $f(x) = 2x^2 + 3x + 3$
b) $f(x) = e^x + 3x^2$
c) $f(x) = x\sqrt{x} - \frac{1}{1+x^2}$

Problem #6. Show that if $F(x)$ is a particular antiderivative of $f(x)$, then, for any $c \neq 0$, $G(x) = \frac{1}{c}F(cx)$ is a particular antiderivative of $g(x) = f(cx)$.

Problem #7. Find the f that satisfies $f''(t) = 2\cos(2t)$, $f(0) = 1$ and $f'(0) = 0$.

Problem #8. Find the f that satisfies $f'(t) = \frac{1}{t}$ and $f(1) = 1$ and $f(-1) = 0$.

Problem #9. Determine the differentiable function f so that $f(0) = 1$ and $f'(x) = \begin{cases} 2x+1 & x < -1 \\ x & x \geq -1 \end{cases}$.

Problem #10. Determine the continuous function g so that $g(0) = 0$ and $g'(x) = \begin{cases} 1-x & x < 2 \\ \frac{4}{x^2} & x > 2 \end{cases}$.

Book Problems.

a) Section 4.7: #4, #10, #44, #48, #76
b) Section 4.9: #18, #34, #38, #50, #78