Problem Set 1 **Calculus 2** **Due 1/22/14**

You are encouraged to work in groups of two to four on this assignment and make a single group submission. Each problem is worth 3 points for correct and clearly justified answers. An additional quality point will be awarded to submissions which are presented in a manner appropriate to good college-level work.

1. Show that the value of the expression $\int_0^x \frac{1}{1+t^2}\,dt + \int_0^{1/x} \frac{1}{1+t^2}\,dt$ does not depend on x.

2. Derive the integration formula $\int \frac{x}{\sqrt{ax+b}}\,dx = \frac{2}{3a^2}(ax-2b)\sqrt{ax+b} + C$ [Line 83 on the table in the back of the book].

3. Consider the parabola $y = x^2$. Pick a point (a, a^2) on this parabola, and label it P. Label the point $(-a, a^2)$ as Q. Find the lines tangent to the parabola at P and Q, and label their point of intersection R. Find the area of the region below segment PQ and above the parabola, and show that this area is equal to two-thirds of the area of triangle PQR.

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