1. Evaluate the following:

   (a) $\dfrac{d}{dx}\displaystyle\int_5^{x^2+e^x} \sin^2(x)dx.$

   (b) $\displaystyle\int \tan(x)dx.$

   (c) $\displaystyle\int_0^3 |2x-3|dx.$

   (d) $\displaystyle\int_0^{\pi/4} \frac{1-\sin^2(\theta)}{\cos^2(\theta)}d\theta.$

2. A solid is formed by adjoining two hemispheres to the ends of a right circular cylinder. Find the dimensions that minimize the cost if the volume must be 300ft^3 and the hemispherical ends cost twice as much per square foot of surface area as the sides.

3. Consider the sum:

$$\sum_{k=1}^{n}(k-2)^2.$$

   (a) Find the value of the sum when $n = 4$ by computing each term.

(b) Find the value of the sum when $n = 50$ by using the summation formulas you were given in class.

4. Find the value of $f(c)$ guaranteed by the Mean Value Theorem for Integrals in the following problem:

$$\int_1^9 \frac{1}{\sqrt{x}(1+\sqrt{x})^2}\,dx.$$

5. Find the volume of the solid generated by revolving the region bounded by $y = x^2$ and $y = 4x - x^2$ about the line $y = 6$.

6. Find the left-hand, right-hand, and midpoint sums for the function $y = (x-3)^2$ on the interval $[1, 3]$ using four equally spaced intervals. What are you approximating, and which of the three is a better estimate for this?

7. Find the total area between the curve $y = \cos^2(2t)$ and the x-axis on the interval $[-\pi/2, \pi]$.