Practice using the FTC

1. Complete the following statement of the Fundamental Theorem of Calculus: If F' (the derivative of F) is continuous, then

$$\int_a^b F'(x)\,dx =$$

2. Find the following exactly (no estimation) using the Fundamental Theorem of Calculus.

   (a) $\displaystyle\int_0^5 \frac{1}{2}x^2 + \sin x\,dx$

   (b) $\displaystyle\int_1^{2.1} x^{-3} - e^x\,dx$

   (c) $\displaystyle\int_1^{\pi} \frac{1}{x} + 2^x \ln 2\,dx$

3. Look again at 2(a). I'm guessing the antiderivative you choose to compute this integral was $F(x) = \frac{1}{6}x^3 - \cos x$. Consider the function $G(x) = \frac{1}{6}x^3 - \cos x + 10$.

   (a) Find $G'(X)$.

   (b) Use G to compute $\int_0^5 \frac{1}{2}x^2 + \sin x \, dx$ again.

   (c) Is your answer above the same as that you found in 2(a)?

   Read the text below Example 1 on page 309 to confirm your answer above and take note of the notation they use as I will adopt it today.

4. Find the following exactly (no estimation) using the Fundamental Theorem of Calculus and the new notation you just learned from page 309.

   (a) $\int_0^1 6q^2 + 4 \, dq$

   (b) $\int_1^{3.5} 2e^t \, dt$