

**Homework 7 — Due 11/22/2010 in class**

**This cover sheet must be attached as the top page of your homework.**

1. Let  $f(x) = (x - 1)^2$ .
  - (a) **Using the definition of the definite integral** (i.e., with limits and sums), find the area under the graph of  $f(x)$  on the region  $[1, 4]$ . Use equal width rectangles (constant  $\Delta x = \frac{b-a}{n}$ ) and right endpoints to evaluate the function on each rectangle.
  - (b) **Using the 1st Fundamental Theorem of Calculus**, find the same area using antiderivatives.
2. Let  $f(x) = x^3 - 3x^2 + 2x$  and find the total area between the curve  $y = f(x)$  and the x-axis over the region  $0 \leq x \leq 2$ . (You may use the 1st Fundamental Theorem of Calculus to do the definite integral(s).)
3. Evaluate the following integral (using the 1st Fundamental Theorem of Calculus) and explain why this answer is different from your answer in question (2):

$$\int_0^2 x^3 - 3x^2 + 3x \, dx.$$

4. Evaluate the following integral (using the 1st Fundamental Theorem of Calculus):

$$\int_0^1 \frac{dx}{1+x^2}.$$

Show your steps and leave your answer in exact arithmetic (i.e., no decimals).