# Worksheet 1: 8.1, 8.3

**Exercise 1**   (§8.1 # 9) Use integration by parts to find

$$\int_1^9 \ln(3x)dx$$

**Exercise 2**   (§8.1 # 21) Take the following integral by whatever means necessary.

$$\int_0^1 \frac{x^3}{\sqrt{3+x^2}}dx$$

**Exercise 3**   (§8.1 # 35) Derive the following formula using integration by parts

$$\int x^n \cdot \ln|x|dx = x^{n+1} \cdot \left[\frac{\ln|x|}{n+1} - \frac{1}{(n+1)^2}\right] + C \quad \text{for } n \geq 0$$

**Exercise 4**   (§8.1 # 41) The rate of growth of a microbe population is given by

$$m'(t) = 27te^{3t}$$

Here $t$ is the time in days. What is the accumulated growth over the first 2 days?

**Exercise 5**   (§8.3 # 11) Suppose that

$$f(t) = .02 \cdot x + 300$$

represents the rate of flow of money in dollars per year. Assume a 10 year period at 8% compounded continuously and find the following: (a) the present value; (b) the accumulated amount of money flow at $t = 10$.

**Exercise 6**   (§8.3 # 17) The rate of continuous money starts at $ 5000 and decreases exponentially at 1% per year for 8 years. Fine the present value and final amoutn at an interest rate of 8% compounded continuously.