

Name: \_\_\_\_\_  
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1. The amount of work required to stretch a certain spring 3 meters beyond its natural length is 15 Newton-meters. Find the spring constant for the spring. (Remember to specify the units.)
2. A chain six feet long and weighing 2 pounds per foot lies in a coil on the ground. How much work is required to lift one end of the chain to a height of six feet?

3. Compute  $\int x \sec^2 x \, dx$

4. Evaluate  $\int_0^{\frac{\pi}{2}} x \cos x \, dx$

5. Compute  $\int \sin^3 x \cos^3 x \, dx$

6. Compute  $\int \sqrt{1 + 2x^2} \, dx$

7. Compute  $\int \frac{x^3}{x^2 + 2x + 4} dx$ .

8. Compute  $\int \frac{8 + 7x - x^2}{x(x + 2)^2} dx$

9. Use the trapezoid rule with  $n = 40$  subintervals to estimate  $\int_0^2 \frac{1}{1+x^3} dx$ . Give bounds on the error in your estimate.

10. Suppose we use the midpoint rule to estimate  $\int_1^2 \frac{1}{x} dx$ . What is the smallest value of  $n$  that will guarantee an error of less than  $10^{-4}$ ?