Compressing a Spring – Suppose a force of 10 N is required to stretch a spring 0.1 m from is equilibrium position and hold it in that position.

- **a.** Assuming that the spring obeys Hooke's Law, find the spring constant k.
- **b.** How much work is needed to compress the spring 0.5 m from its equilibrium position?
- **c.** How much work is needed to stretch the spring 0.25 m from its equilibrium position?
- **d.** How much additional work is required to stretch the spring 0.25 m from its equilibrium position?

Pumping Water – How much work is needed to pump all the water our of a cylindrical tank with a height of 10 m and a radius of 5 m? The water is pumped to an outflow pipe 15 m above the bottom of the tank.

REVIEW – Solve the following problems

Evaluate $\int_{-2}^{3} x^2 - x - 6\, dx$

Find the average value of $f(x) = \cos x$ on $\left[-\frac{\pi}{2}, \frac{\pi}{2}\right]$

Evaluate $\int 2x(x^2 - 1)^{99}\, dx$

Find the area bounded between $f(x) = x$ and $g(x) = x^2 - 2$

Find the volume of the solid formed by revolving the curve $f(x) = e^{-x}$ around the x-axis on $(0, \ln 4)$

Find the volume of the solid formed by revolving the area between the curves $f(x) = 4 - x$ and $g(x) = 2$ around the x-axis