

1. (4 points) Find the work done pulling a 50 kg mass from the ground to the top of a 10 meter building using a chain with density 3 kg/meter. Use g for standard gravity.
2. (4 points) A ten Newton force is required to hold a spring at 2 meters from equilibrium. How much work is needed to stretch the spring from equilibrium to 5 meters beyond it?
3. (5 points) Find the work done pumping water out the top of a conical tank formed by rotating the curve $y = x$ about the y -axis, $0 \leq x \leq 1$. Use ρ for the density of water and g for standard gravity.

4. Evaluate the following integrals. Show work or some defense of your answer.

(a) (4 points) $I = \int_0^\pi e^{\cos(t)} \sin(2t) dt$

(b) (4 points) $I = \int_0^{0.5} x\sqrt{1-4x^2} dx$

(c) (4 points) $I = \int \frac{dx}{1-\sin(x)}$. Hint: Conjugate!