

1. Suppose we take the region bounded by the curves

$$x = (y + 1)^2$$

$$y = x - 3$$

and rotate it around the line

$$y = 2$$

- (a) Write an integral(s) with respect to y representing the volume of the resulting solid of revolution. You do not need to evaluate or simplify your integral(s).

- (b) Write an integral(s) with respect to x representing the volume of the resulting solid of revolution. You do not need to evaluate or simplify your integral(s).

2. A 10 foot chain weighing 20 pounds hangs off the side of a platform. At the end of the chain is a bucket weighting 5 pounds. How much work is needed to pull both the chain and the bucket to the platform? Show your work, writing and evaluating an appropriate integral.

3. We heat an oven. Suppose that

$f(t)$ = The temperature of the oven ($^{\circ}\text{F}$) at time t (minutes)

$g(t)$ = The rate the temperature of the oven increases ($^{\circ}\text{F} / \text{minute}$) at time t (minutes)

- (a) Write an expression using $f(t)$ and no other variables representing the average temperature of the oven from 10 minutes to 30 minutes. Include appropriate units in your answer.
- (b) Write an expression using $f(t)$ and no other variables representing the average rate the temperature of the oven increases from 10 minutes to 30 minutes. Include appropriate units in your answer.
- (c) Write an expression using $g(t)$ and no other variables representing the average rate the temperature of the oven increases from 10 minutes to 30 minutes. Include appropriate units in your answer.