4. [4 points]
Let $S$ be the region bounded by the $x$-axis, the line $x = 0.5$, and the line $y = 4 - 4x$. This region is shown to the right. The units on both the $x$- and the $y$-axis are centimeters.

A solid is obtained by rotating the region $S$ about the $y$-axis. The mass density of the resulting solid at each point $y$ centimeters above the $x$-axis is $16y$ grams per cubic centimeter.

Write, but do not evaluate, an expression involving one or more integrals that gives the mass, in grams, of the resulting solid.

**Answer:** Mass =

5. [5 points] Prior to the start of an indoor winter carnival, the water tank for a dunking booth is being filled from a water hose at a rate of 8 gallons per minute. Unfortunately, once the tank has 50 gallons of water in it, the tank begins leaking water at a rate (in gallons per minute) that is proportional to the square root of the volume of water in the tank (in gallons) with constant of proportionality $k > 0$. Let $W = W(t)$ be the volume, in gallons, of water that is in the tank $t$ minutes after the tank begins to leak. Write a differential equation that models $W(t)$ and give an appropriate initial condition.

**Answer:** Differential Equation:

Initial Condition: