Recall 8/29 notes.

I began with a quick review/exposition of falling body formulation. I think it just confused the issue. It's good stuff, and we could talk about that, and how it relates to the question at hand, I couldn't resist bringing it up, because the velocity of the water out of an outlet at the bottom, when the water is at a height *h*, is the same as the velocity of a falling body from height *h* when it hits the ground.

But all I managed to do was confuse the model we *really* wanted to focus on, and that model also used *h* and *v* as variables. *sigh*.

We equate Kinetic energy with (gravitational) potential energy.

$\frac{1}{2}mv^2 = mgh \Rightarrow$

$\frac{1}{2}v^2 = gh \Rightarrow$

$v = \sqrt{2gh}$ (assume $v \geq 0$)

This is the velocity of the water out the bottom. (ft/s)

We obtain rate of change of volume by multiplying by the area of the outlet port A_p

Let V (not same as "v") be volume of water in tank.

Then $\frac{dV}{dt} = -A_p\sqrt{2gh}$

§3.2 #4 we introduce constant $c \in (0,1)$ that slows things down

$$\boxed{\frac{dV}{dt} = -cA_p\sqrt{2gh}}$$