

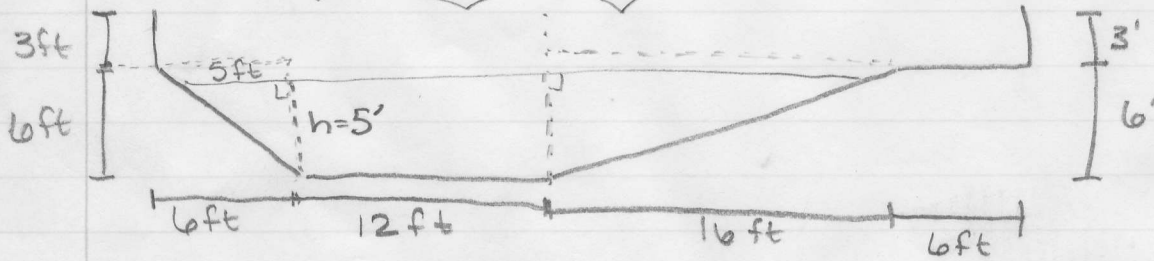
P. 268 #24

20 ft wide  
40 ft long  
3 ft deep (shallow end)  
9 ft deep (deepest end)

$$\frac{dV}{dt} = 0.8 \text{ ft}^3/\text{min}$$

$$\frac{dh}{dt} \text{ when } h = 5 \text{ ft}$$

$$\frac{dV}{dt} = \frac{dV}{dh} \frac{dh}{dt}$$



$$V = \left(\frac{1}{2} b h w\right) + (b h w) + \left(\frac{1}{2} b h w\right) + (b \cdot h \cdot w)$$

$$V = \left(\frac{1}{2} h \cdot h \cdot 20\right) + (20 \cdot 12 h) + \left(\frac{1}{2} \cdot h \cdot h \cdot 20\right) + (0)$$

$$V = 10(h(t))^2 + 240 h(t) + \frac{80}{3}(h(t))^2$$

$$V' = \frac{dV}{dt} = 20 h(t) \frac{dh}{dt} + 240 \frac{dh}{dt} + \frac{160}{3} h(t) \frac{dh}{dt}$$

$$\lim_{h \rightarrow 5} \frac{dV}{dt} = 20(5) \frac{dh}{dt} + 240 \frac{dh}{dt} + \frac{160}{3} (5) \frac{dh}{dt}$$

$$0.8 \text{ ft}^3/\text{min} = 100 \frac{dh}{dt} + 240 \frac{dh}{dt} + \frac{800}{3} \frac{dh}{dt}$$

$$0.8 \text{ ft}^3/\text{min} = \frac{1820}{3} \frac{dh}{dt}$$

$$(0.8) \frac{3}{1820} = \frac{dh}{dt}$$

$$\frac{dh}{dt} \approx .00132 \text{ ft}/\text{min}$$