8.3 example

1. The volume of water in an above-ground pool is 45 000 L. A pump can move water at a rate of

$$r_{\text{pump}}(t) = \frac{20\left(35 + \log_{10}\left(\frac{t+1}{100}\right)\right)}{\frac{t}{100} + 3} \text{ L/min}$$

where t is time measured in minutes.

(a) How much water would be in the pool if water is pumped in for 30 minutes?

(b) How much water would be in the pool if water is pumped out for 30 minutes?

(c) Suppose the pump is being used to move water into the pool. Suppose further that there is a leak in the pool, where water is leaking at a rate of

$$r_{\text{leak}}(t) = 225 - t \sin \frac{t}{11}$$

On the interval $t \in [0, 30]$:

(i) When is the pool at its fullest?

(ii) When is the pool at its emptiest?

(iii) Is the volume of the pool increasing or decreasing at $t = 30$?