

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

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

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 $t = 30$?