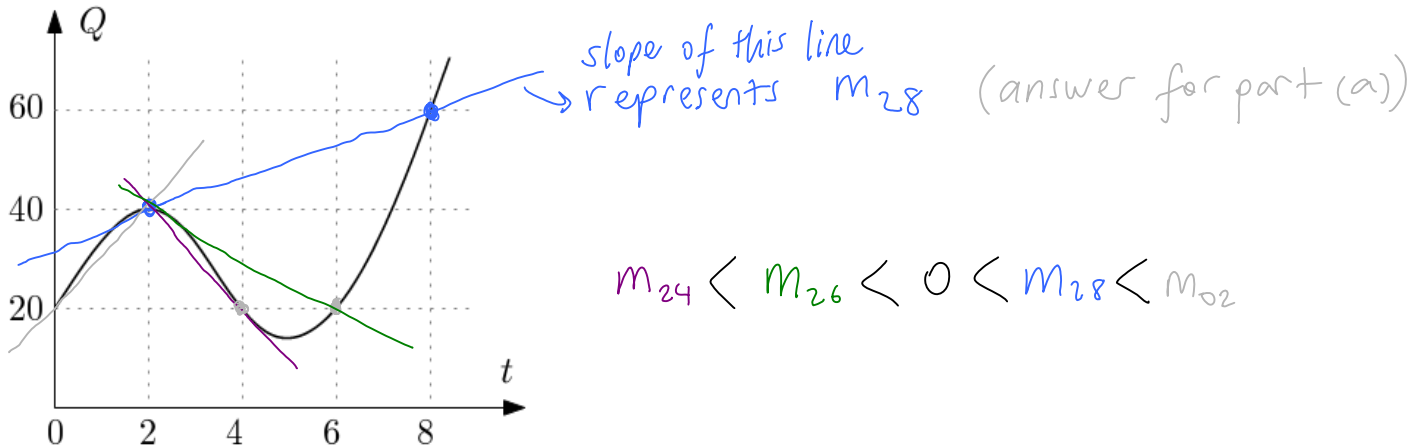


1. The quantity  $Q$  of water in a water tower is shown in the following figure.

(a) Represent the average rate of change in water amount over the time period  $[2, 8]$  graphically on the figure.

(b) List  $m_{02}, m_{24}, m_{26}, m_{28}$  in increasing order, where  $m_{ab}$  denotes the average rate of change in  $Q$  over the interval  $[a, b]$ .



2. A company that makes picture frames has fixed costs \$6000. Producing each picture frame costs \$2 and they are sold at \$12.

(a)  $C(q) = \underline{6000 + 2q}$

(b)  $R(q) = \underline{12q}$

(c) After how many units does the company start to make profit?

break-even point:

$$R(q) = C(q)$$

$$12q = 6000 + 2q$$

$$10q = 6000 \longrightarrow q = 600$$

after producing and selling 600 units the company starts to make profit

3. In a farm there were 250 rabbits in January 1st, 2005 and 280 rabbits in April 1st, 2005. If the rabbit population is increasing exponentially, find a formula for the rabbit population  $P(t)$  where  $t$  is the number of months since January 1st, 2005.

Jan 1  $\leftrightarrow t=0$   
 Apr 1  $\leftrightarrow t=3$  (3 months since Jan 1)

$t$	Jan 1 0	Feb 1 1	Mar 1 2	Apr 1 3
$P$	250			280

$$P(t) = P_0 \cdot a^t = 250 \cdot a^t$$

$$P(3) = 280 = 250 \cdot a^3 \longrightarrow a^3 = \frac{280}{250} \longrightarrow a = \sqrt[3]{\frac{280}{250}} = 1.0385$$

$$P(t) = 250 \cdot (1.0385)^t$$