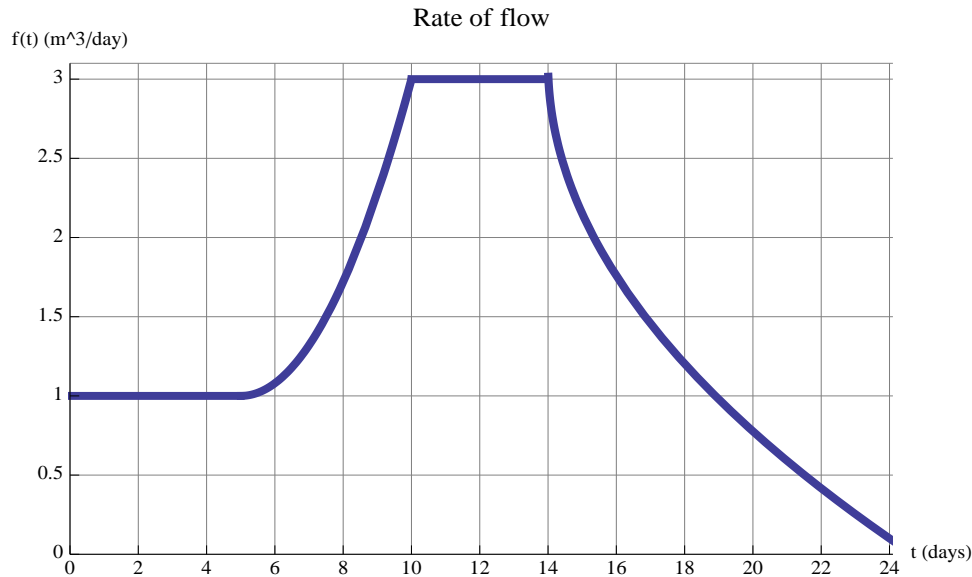


3. [11 points] Sewage flows into the tank described in the previous problem at a rate of $f(t)$ cubic meters per day. Let t be the number of days since December 1, when the tank had $1 m^3$ of sewage. A graph of $f(t)$ is given below. Use it to answer the following questions.



- a. [3 points] Suppose that $V(t)$ gives the volume of sewage in the tank at time t . Find a formula for $V(t)$ in terms of $f(t)$.
- b. [2 points] For what times t in $[0, 24]$ is $V(t)$ concave up? _____
- c. [2 points] For what times t in $[0, 24]$ is $V(t)$ concave down? _____
- d. [4 points] Fill out the table below. Using the values in your table, compute Riemann sums with 3 subintervals to find an underestimate and an overestimate for $V(12)$. Justify why the Riemann sums you selected yield the appropriate under and upper estimates. Do not forget to include the units in your answer.

t	0	4	8	12
$f(t)$				