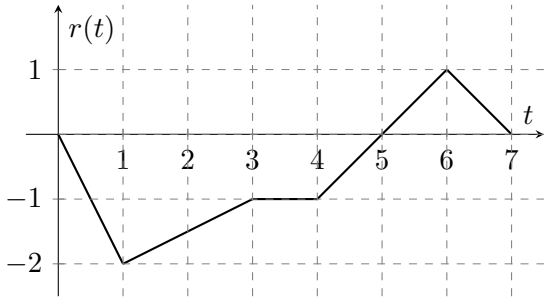
2. [11 points] In the game of *Vegetable Crossing*, Tina is carefully monitoring the stork market, which determines the price of a stork in dubloons, the game's currency. If t is the number of days since Tina started playing, then $r(t)$, measured in dubloons per day, gives the **rate of change** of the price of a stork in the game. A graph of $r(t)$ is shown below. Note that $r(t)$ is piecewise linear.



a. [2 points] For what value of t in $[0, 7]$ is the price of a stork growing fastest?

Solution: This will occur when $r(t)$ is at a maximum, so $t = 6$.

b. [2 points] Tina wants to buy storks when the price is as low as possible. For what value of t in $[0, 7]$ should she buy storks?

Solution: This will occur when the signed area between $r(t)$ and the t-axis is at a minimum, so $t = 5$.

c. [3 points] What is the average value of $r(t)$ on the interval $[3, 5]$? Be sure to write down any integrals you use to obtain your answer.

Solution: The average value of $r(t)$ on $[3, 5]$ is

$$\frac{1}{5-3}\int_3^5 r(t)dt.$$

Counting boxes using the grid, the integral has value -1.5, so the average value is -0.75.

d. [4 points] Let $R(t)$ be the price of a stork in dubloons at time t, and assume that $R(t)$ is continuous. The price of a stork at time $t = 3$ is 14 dubloons. Given that information, fill out the following table of values:

t	0	2	4	6
$R(t)$	18	$14 + \frac{5}{4}$	13	13

Solution: We get the values in the table by adding or subtracting the appropriate areas from 14, as we move toward or away from the t-value $t = 3$. For example, between $t = 2$ and $t = 3$, $R(t)$ decreases by 5/4, so $R(2) = 14 + \frac{5}{4}$.