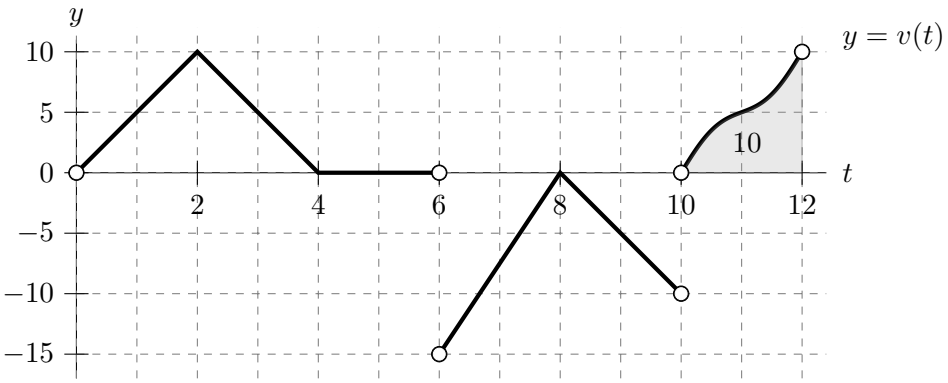
4. [15 points] Elana goes on an amusement park ride that moves straight up and down. Let $v(t)$ model Elana's velocity (in meters/second) t seconds after the ride begins (where $v(t)$ is positive when the ride is moving upwards, and negative when the ride is moving downwards). A graph of $v(t)$ for $0 < t < 12$ is shown below. Assume that $v(t)$ is piecewise linear for $0 < t < 6$ and $6 < t < 10$, and that the area of the shaded region is 10, as indicated on the graph.



a. [4 points] Write an integral that gives Elana's average velocity, in meters/second, from 2 seconds into the ride until 4 seconds into the ride. Then compute the exact value of this integral.

Answer: $\dfrac{1}{4-2}\displaystyle\int_2^4 v(t)dt$ = 5

Let $h(t)$ be Elana's height (in meters) above the ground t seconds after the ride begins. Assume that h is continuous, and suppose Elana is at a height of 10 meters above the ground when the ride begins.

b. [6 points] Fill in the exact values of $h(t)$ in the table below.

t	0	2	4	6	8	10	12
$h(t)$	10	20	30	30	15	5	15

c. [5 points] Using your work from part **b.**, sketch a detailed graph of $h(t)$ for $0 < t < 12$. In your sketch, be sure that you pay close attention to each of the following:

- where h is increasing, decreasing, or constant
- the values of $h(t)$ you found in part **b.** above
- where h is/is not differentiable
- the concavity of the graph of $y = h(t)$