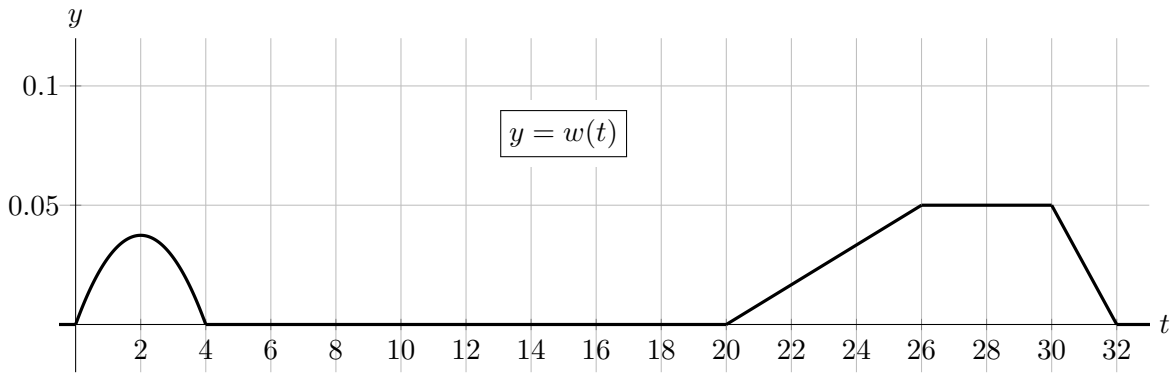
6. [9 points] As part of his exercise routine, a man goes for walks of various lengths of time. The lengths of the man's walks, where t is measured in minutes, are described by the density function $w(t)$. A portion of the graph of $w(t)$ is shown below.



a. [3 points] Complete the following English sentence:

The fraction of the man's walks that are between 20 and 28 minutes long is ...

Solution: 0.25 (or 25%)

b. [3 points] Circle the ONE sentence below that BEST corresponds to the mathematical statement $w(3) \approx 0.028$.

i. Approximately 3% of the man's walks last between 0.028 and 1.028 minutes.

ii. Approximately 1.4% of the man's walks last between 3 and 3.5 minutes.

iii. Approximately 28% of the man's walks last between 3 and 4 minutes.

iv. Approximately 2.8% of the man's walks last exactly 3 minutes.

v. Approximately 3% of the man's walks last approximately 2.8 minutes.

c. [3 points] Does the man take any walks that last longer than 32 minutes? Explain.

Circle one: YES NO NOT ENOUGH INFORMATION

Explanation:

Solution: We see that

$$\int_0^{32} w(t)\,dt = \int_0^4 w(t)\,dt + \int_{20}^{32} w(t)\,dt = \int_0^4 w(t)\,dt + 0.4$$

$$\leq \text{MID}(1) + 0.4 \quad \text{(where MID(1) is an (over)estimate of } \int_0^4 w(t)\,dt \text{ as this portion of the graph of } w(t) \text{ is concave down)}$$

$$< 0.05(4) + 0.4 = 0.6$$

So less that 60% of the man's walks are represented by the portion of the graph shown above. Since walks cannot last for a negative length of time, at least 40% of the man's walks last longer than 32 minutes.