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.

![Graph of w(t)](attachment:graph.png)

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 \( \int_0^4 w(t) \, dt \) as this portion of the graph of \( w(t) \) is concave down)} \\
< 0.05(4) + 0.4 = 0.6
\]

So less than 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.