1. [8 points] Ricky’s college has installed a new model of napping pod in the library for students to get some well-deserved rest. Let \( f(t) \) be the **probability density function** (pdf) for the amount of time, \( t \), Ricky sleeps after he falls asleep in a pod, where \( t \) is measured in hours. A partial graph of \( f(t) \) is shown below. Note that \( f(t) \) is piecewise linear on the interval \([0, 2]\) and that \( f(t) = 0 \) for all \( t < 0 \).

![Graph](image)

Additionally, you may assume that \( c \) is a positive real number, and that the value of the shaded area between \( f(t) \) and the \( t \)-axis on \([2, 4]\) is given by the positive number \( A \).

a. [2 points] Suppose \( f(8) = 0.03 \). Complete the following sentence:

“The probability that Ricky gets between 7.8 hours and 8.2 hours of sleep is . . . ”

\[
\text{Solution: } \ldots \text{approximately } (0.4)(0.03) = 0.012 = 1.2\%.
\]

b. [2 points] Find the probability that Ricky gets 1 or fewer hours of sleep. Your answer may be given in terms of \( c \).

\[
\text{Answer: } 6c
\]

c. [2 points] Suppose that there is a 15% chance that Ricky gets 4 hours of sleep or more. Find the value of \( A \) in terms of \( c \).

\[
\text{Solution: } 9c + A = 0.85, \text{ so } A = 0.85 - 9c
\]

\[
\text{Answer: } A = 0.85 - 9c
\]

d. [2 points] The median amount of time Ricky spends sleeping in a pod is 1 hour and 30 minutes. Find the value of \( c \).

\[
\text{Solution: } 7.5c = 0.5, \text{ so } c = \frac{0.5}{7.5} = \frac{1}{15}.
\]

\[
\text{Answer: } \frac{1}{15}
\]