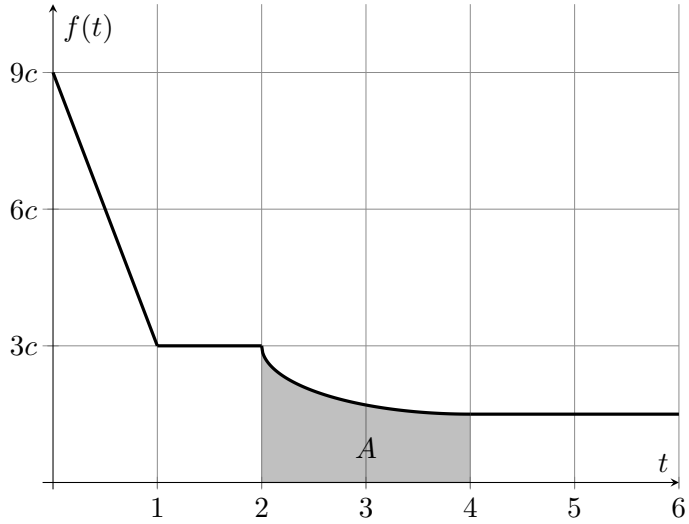
1. [8 points] Ricky's college has installed a new model of napping pod in the library for students to get some well-deserved rest. Let $f(t)$ be the **probability density function** (pdf) for the amount of time, t, Ricky sleeps after he falls asleep in a pod, where t is measured in hours. A **partial** 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 $t < 0$.



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 . . . "

Solution: . . . 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.

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.

Solution: $9c + A = 0.85$, so $A = 0.85 - 9c$

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.

Solution: $7.5c = 0.5$, so $c = \frac{0.5}{7.5} = \frac{1}{15}$.

Answer: $\frac{1}{15}$