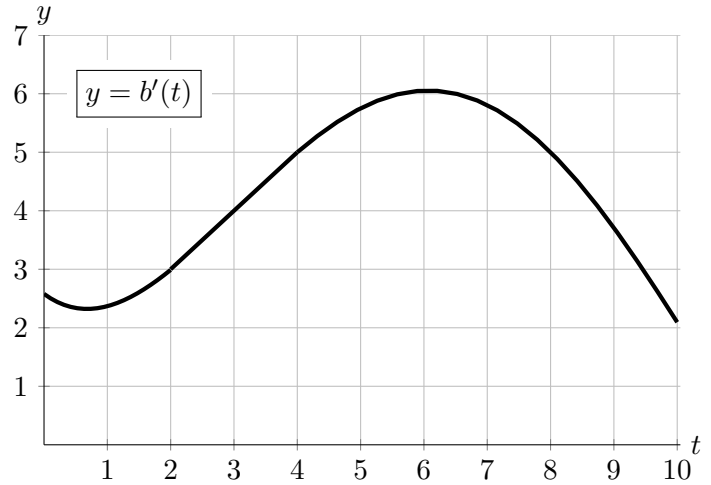


2. [9 points]

A scientist conducted an experiment in which she grew a bacterial culture in a petri dish. Let $b(t)$ be the amount of bacteria, as measured by mass in milligrams (mg), contained in the dish t hours into the experiment. A portion of the function $b'(t)$, the **derivative** of $b(t)$, is graphed to the right.



The graph of $b'(t)$ passes through the points $(2, 3)$, $(3, 4)$, $(4, 5)$ and $(8, 5)$. You may estimate any other values you need in this problem from the given graph.

a. [2 points] Using the graph, complete the following sentence.

Eight hours into the experiment, in the next ten minutes the amount of bacteria in the dish ...

(circle one) INCREASED DECREASED by approximately _____ mg.

b. [2 points] Four hours into the experiment, there were 32.5 mg of bacteria in the dish. Write a formula for the linear approximation $L(t)$ of $b(t)$ near $t = 4$.

Answer: $L(t) =$ _____

c. [2 points] Use $L(t)$ from part **b.** to estimate the amount of bacteria, in mg, in the dish at time $t = 4.3$. Is this estimate an overestimate, an underestimate, neither of these, or is there not enough information to decide?

Answer: Amount of bacteria at $t = 4.3$ is \approx _____ mg

Circle one: OVERESTIMATE UNDERESTIMATE NEITHER NOT ENOUGH INFO

d. [3 points] Three hours into the experiment, there were 28 mg of bacteria in the dish. Write a formula for the quadratic approximation $Q(t)$ of $b(t)$ near $t = 3$.

Answer: $Q(t) =$ _____