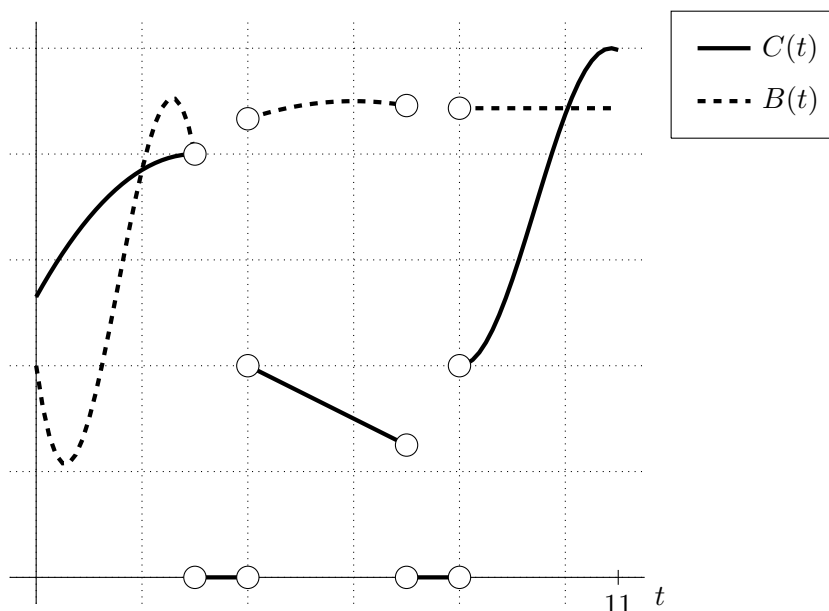


7. [9 points] Boxers Paul “Stretch” Cassenick and Stephen “Dee” Boxer decide to rematch for the heavyweight title. Suppose that the match consists of three 3-minute rounds with a 1-minute break in between each round. Suppose $C(t)$ is a function which models the number of punches Paul throws per minute, t minutes after the start of the match. Similarly, suppose $B(t)$ models the number of punches Stephen throws per minute, t minutes after the start of the match. Assume all punches thrown in the match are taken by the opponent.



- a. [3 points] Find an expression involving integrals that represents the average number of punches thrown per minute by Stephen t minutes after the fight has started.

Solution: The average value of B on the interval $[0, t]$ is $\frac{1}{t} \int_0^t B(p) dp$.

- b. [2 points] Paul’s scoring margin at time t is defined to be

(Total punches thrown by Paul at time t) – (total punches taken by Paul at time t).

At approximately what time(s) is Paul’s scoring margin the largest? The smallest?

Largest at $t =$ 2

Smallest at $t =$ 10

- c. [4 points] Assuming that the winner is the boxer who threw the most punches, who wins the fight? Give a brief justification of your answer making reference to the graph.

Solution: Based on the graphs, $\int_0^{11} B(t) dt > \int_0^{11} C(t) dt$, so Stephen is the winner of the fight.