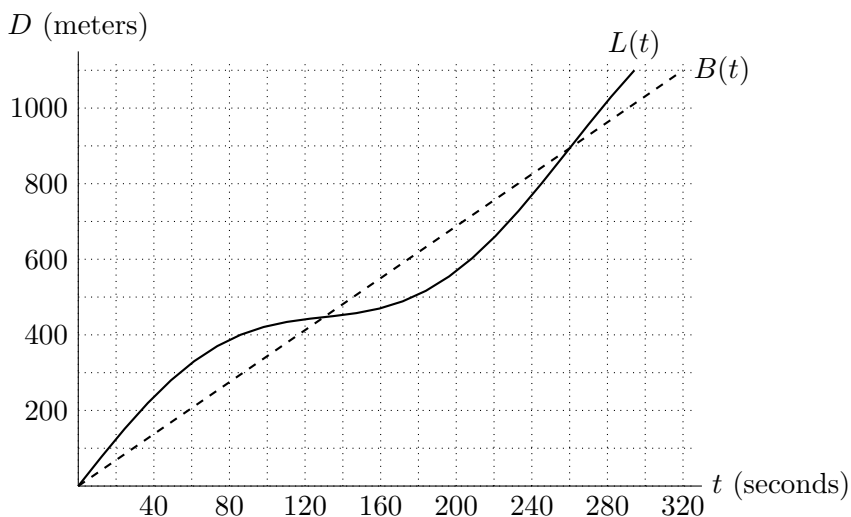


6. [11 points] Link and Boots decided to have a race down a straight portion of Pauline Boulevard that is 1.1 kilometers long. Let  $L(t)$  and  $B(t)$  be Link's and Boots's respective distances from their starting point  $t$  seconds after the race began. A graph of  $L(t)$  and  $B(t)$  is shown below.



- a. [1 point] Who won the race? (Circle your answer.)

Link

Boots

- b. [2 points] Estimate the times at which Link and Boots were running at the same speed.

*Solution:* They are running the same speed when the two curves have the same slope. This occurs at about  $t = 65$  and  $t = 195$ .

- c. [3 points] Estimate Link's average velocity over the first 100 seconds of the race. Include units.

*Solution:*

$$\text{average velocity} = \frac{L(100) - L(0)}{100} \approx \frac{425 - 0}{100} = 4.25 \text{ meters/second}$$

- d. [3 points] Estimate Link's instantaneous velocity 40 seconds after the race began. Include units.

*Solution:* Estimate the slope of the tangent line to the graph of  $L(t)$  at  $t = 40$ . The slope is about 5.1, which means his velocity is about 5.1 meters/second.

- e. [2 points] 160 seconds after the race began, is Link's acceleration positive, negative, or equal to zero? (Circle your answer.)

positive

negative

zero