Classroom Voting Questions: Calculus II

Section 5.1: How Do We Measure Distance Traveled?

1. **True or False** The left-sum always underestimates the area under the curve.
   
   (a) True, and I am very confident
   (b) True, but I am not very confident
   (c) False, but I am not very confident
   (d) False, and I am very confident

2. **True or False** Averaging the left- and right-sums always improves your estimate.
   
   (a) True, and I am very confident
   (b) True, but I am not very confident
   (c) False, but I am not very confident
   (d) False, and I am very confident

3. **True or False** When estimating an integral with right or left sums, smaller rectangles will always result in a better estimation.
   
   (a) True, and I am very confident
   (b) True, but I am not very confident
   (c) False, but I am not very confident
   (d) False, and I am very confident

4. Consider the graph in Figure 5.1. On which interval is the left-sum approximation of the area under the curve on that interval an overestimate?

![Figure 5.1](image)
5. The velocities of two cars are given in Figure 5.2. Assuming that the cars start at the same place, when does Car 2 overtake Car 1?

(a) Between 0.75 and 1.25 minutes
(b) Between 1.25 and 1.75 minutes
(c) Between 1.75 and 2.25 minutes

6. You are taking a long road trip, and you look down to check your speed every 15 minutes. At 2:00 you are going 60 mph, at 2:15 you are going up a hill at 45 mph, at 2:30 you are going 65 mph, at 2:45 you are going through a canyon at 50 mph, and at 3:00 you are going 70 mph. Assume that in each 15-minute interval you are either always speeding up or always slowing down.

Using left-hand sums, how far would you estimate that you went between 2:00 and 3:00?

(a) \(\frac{1}{4}60 + \frac{1}{4}45 + \frac{1}{4}65 + \frac{1}{4}50 + \frac{1}{4}70\)
(b) \(\frac{1}{4}60 + \frac{1}{4}45 + \frac{1}{4}65 + \frac{1}{4}50\)
(c) \(\frac{1}{4}45 + \frac{1}{4}65 + \frac{1}{4}50 + \frac{1}{4}70\)
(d) \(\frac{1}{4}60 + \frac{1}{4}65 + \frac{1}{4}65 + \frac{1}{4}70\)
(e) \(\frac{1}{15}60 + \frac{1}{15}45 + \frac{1}{15}65 + \frac{1}{15}50 + \frac{1}{15}70\)

7. You are taking a long road trip, and you look down to check your speed every 15 minutes. At 2:00 you are going 60 mph, at 2:15 you are going up a hill at 45 mph, at 2:30 you are going 65 mph, at 2:45 you are going through a canyon at 50 mph, and
at 3:00 you are going 70 mph. Assume that in each 15-minute interval you are either always speeding up or always slowing down.

Using right-hand sums, how far would you estimate that you went between 2:00 and 3:00?

(a) \( \frac{1}{4} \cdot 60 + \frac{1}{4} \cdot 45 + \frac{1}{4} \cdot 65 + \frac{1}{4} \cdot 50 + \frac{1}{4} \cdot 70 \)

(b) \( \frac{1}{4} \cdot 60 + \frac{1}{4} \cdot 45 + \frac{1}{4} \cdot 65 + \frac{1}{4} \cdot 50 \)

(c) \( \frac{1}{4} \cdot 45 + \frac{1}{4} \cdot 65 + \frac{1}{4} \cdot 50 + \frac{1}{4} \cdot 70 \)

(d) \( \frac{1}{4} \cdot 60 + \frac{1}{4} \cdot 65 + \frac{1}{4} \cdot 65 + \frac{1}{4} \cdot 70 \)

8. You are taking a long road trip, and you look down to check your speed every 15 minutes. At 2:00 you are going 60 mph, at 2:15 you are going up a hill at 45 mph, at 2:30 you are going 65 mph, at 2:45 you are going through a canyon at 50 mph, and at 3:00 you are going 70 mph. Assume that in each 15-minute interval you are either always speeding up or always slowing down.

What would be your estimate of the maximum possible distance that you could have traveled between 2:00 and 3:00?

(a) \( \frac{1}{4} \cdot 60 + \frac{1}{4} \cdot 45 + \frac{1}{4} \cdot 65 + \frac{1}{4} \cdot 50 + \frac{1}{4} \cdot 70 \)

(b) \( \frac{1}{4} \cdot 60 + \frac{1}{4} \cdot 45 + \frac{1}{4} \cdot 65 + \frac{1}{4} \cdot 50 \)

(c) \( \frac{1}{4} \cdot 45 + \frac{1}{4} \cdot 65 + \frac{1}{4} \cdot 50 + \frac{1}{4} \cdot 70 \)

(d) \( \frac{1}{4} \cdot 60 + \frac{1}{4} \cdot 65 + \frac{1}{4} \cdot 65 + \frac{1}{4} \cdot 70 \)

9. The table below gives a car’s velocity, \( v \), in miles per hour, with time, \( t \), in minutes. In each of the four fifteen-minute intervals, the car is either always speeding up or always slowing down. The car’s route is a straight line with four towns on it. Town A is 60 miles from the starting point, town B is 70 miles from the starting point, town C is 73 miles from the starting point, and town D is 80 miles from the starting point.

<table>
<thead>
<tr>
<th>( t ) (minutes)</th>
<th>0</th>
<th>15</th>
<th>30</th>
<th>45</th>
<th>60</th>
</tr>
</thead>
<tbody>
<tr>
<td>( v ) (miles per hour)</td>
<td>60</td>
<td>75</td>
<td>72</td>
<td>78</td>
<td>65</td>
</tr>
</tbody>
</table>

We know the car is

(a) between towns A and B.

(b) between towns B and C.

(c) between towns C and D.

(d) between towns A and D, but can’t define more clearly.

(e) past town D.

(f) None of the above.