

- d. After their race, Alex and Misha walk north to get some lunch in town. Part way through this trip, Alex realizes he left his watch at the field, and so they turn around and walk south until they return to Ferry Field. They get Alex's watch and then walk north again. Their distance in miles from Ferry Field,  $t$  minutes after they leave for the first time, is given by the differentiable function  $D(t)$ . Some values for  $D(t)$  are provided in the table below.

$t$	3	6	10	12	13	15	19	24
$D(t)$	0.15	0.32	0.57	0.40	0.27	0.03	0.21	0.43

- i. [2 points] What is their average velocity between  $t = 10$  and  $t = 19$ ? Include units.

**Answer:** = \_\_\_\_\_

- ii. [2 points] Estimate their instantaneous velocity 16 minutes into their trip. Include units.

**Answer:** = \_\_\_\_\_

- iii. [2 points] On which of the following interval(s) **must**  $D'(t)$  be less than or equal to zero for **all** values of  $t$  in the interval? Circle all correct choices.

[3, 6]      [6, 10]      [10, 12]      [12, 13]      [13, 15]      NONE OF THESE

2. [5 points] The logistic function, which is frequently used in machine learning applications, is given by the formula

$$S(r) = \frac{1}{1 + e^{-2r}}.$$

Use the limit definition of the derivative to write an explicit expression for  $S'(3)$ . *Your answer should not involve the letter  $S$ . Do not attempt to evaluate or simplify the limit.* Please write your final answer in the answer box provided below.

**Answer:**  $S'(3) =$