

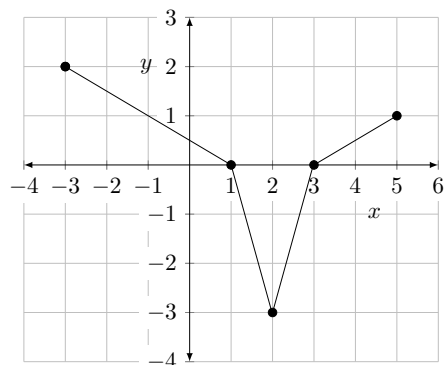
Name: _____

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Mini-math Div 3/4: Monday, November 20, 2023 (15 minutes)

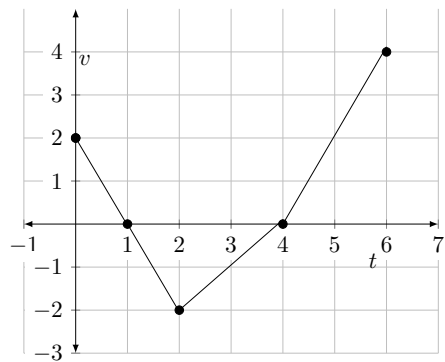
1. (2 points) The graph of the piecewise linear function f is shown in the figure to the right. What is the average value of f over $[-3, 5]$?

- A. -1
- B. $-1/8$
- C. 0
- D. $1/4$
- E. 2



2. (2 points) The graph of the velocity of a function is the piecewise linear function shown in the figure to the right. The initial position of the particle at time $t = 0$ is $x = 1$. What is the total distance the particle travels from $t = 0$ to $t = 6$?

- A. 2
- B. 3
- C. 4
- D. 8
- E. 9



3. (2 points) The acceleration of a particle is modelled by $a(t) = 2t + 3$ for $t \geq 0$. At $t = 0$, the velocity of the particle is -2 and its position is 2.5 . What is the change in displacement of the particle from $t = 0$ to $t = 3$?

A. 9 B. 16 C. 16.5 D. 19 E. 22.5

4. (2 points) Suppose f is a differentiable function. Which of the following statements are true:

- (I) The average value of the derivative of f over $[a, b]$ is the same as the average rate of change of f over $[a, b]$.
(II) There exists a $c \in [a, b]$ for which $f(c)$ equals the average value of f over $[a, b]$.

A. (I) only B. (II) only C. Both (I) and (II) D. Neither (I) nor (II)

E. The truth of both statements depend on the specific choice of f

5. (2 points) Water is leaking out of a tub at a rate modelled by $r(t) = \frac{1}{t^2 + 1} \text{ cm}^3/\text{min}$, where t is in minutes. If the initial volume of the tub is $160\,000 \text{ cm}^3$, which of the following represents the volume of the tub at time t ?

A. $160000 + \int_0^t r(t) dt$

B. $160000 - \int_0^t r(t) dt$

C. $160000 - \frac{1}{t^2 + 1}$

D. $160000 + \frac{r(t)}{t^2 + 1}$

E. $\frac{1}{t^2 + 1}$

6. (2 points) Find the area of the bounded region in the first quadrant below both $y = x^2$ and $y = 2 - x$ and above the x -axis.

A. $2/3$

B. $5/6$

C. 1

D. $7/6$

E. 3

7. (4 points) Write an integral (or integrals) to calculate the area of the finite region(s) bounded by the given curves.

$$x + y = 1, \quad 2x - y = -1, \quad 4x - y = 4$$