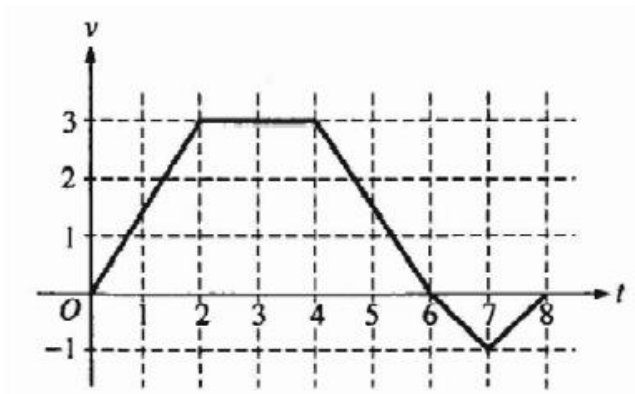


AP Questions 4.1 – 4.3

Name: _____

1.

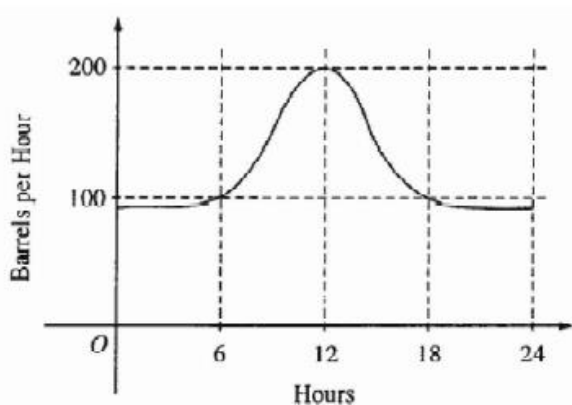


A bug begins to crawl up a vertical wire at time $t = 0$. The velocity of the bug at time t , $0 \leq t \leq 8$, is given by the function whose graph is shown above.

What is the total distance the bug traveled from $t = 0$ to $t = 8$?

- (A) 14 (B) 13 (C) 11 (D) 8 (E) 6

2.



The flow of oil, in barrels per hour, through a pipeline on July 9 is given by the graph shown above. Of the following, which best approximates, the total number of barrels of oil that passed through the pipeline that day?

- (A) 500 (B) 600 (C) 2,400 (D) 3,000 (E) 4,800

3.

t (sec)	0	2	4	6
$a(t)$ (ft/sec ²)	5	2	8	3

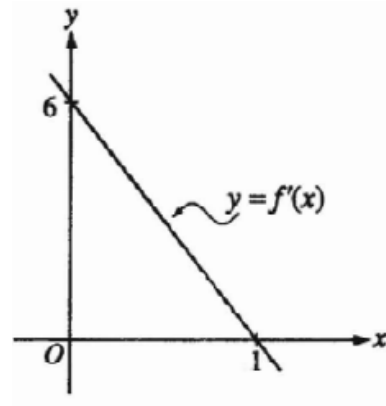
The data for the acceleration $a(t)$ of a car from 0 to 6 seconds are given in the table above. If the velocity at $t = 0$ is 11 feet per second, the approximate value of the velocity at $t = 6$, computed using a left-hand Riemann sum with three subintervals of equal length is

- (A) 26 ft/sec (B) 30 ft/sec (C) 37 ft/sec (D) 39 ft/sec (E) 41 ft/sec

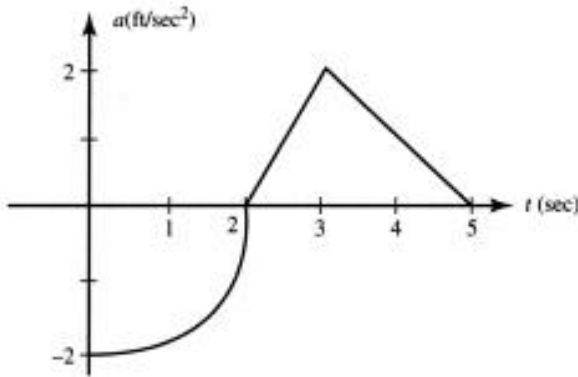
4. The graph of f' , the derivative of f , is the line shown in the figure to the right.

If $f(0) = 5$, then $f(1) =$

- (A) 0
- (B) 3
- (C) 6
- (D) 8
- (E) 11



5.



The graph above shows an object's acceleration (in ft/sec^2). It consists of a quarter-circle and two line segments. If the object was at rest at $t = 5$ seconds, what was its initial velocity?

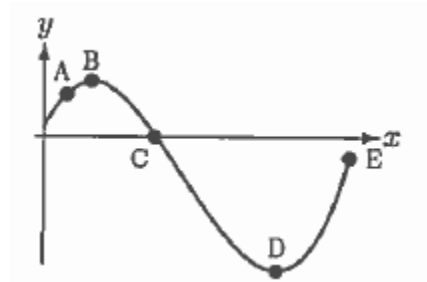
- (A) $-2 \text{ ft}/\text{sec}$
- (B) $3 - \pi \text{ ft}/\text{sec}$
- (C) $0 \text{ ft}/\text{sec}$
- (D) $\pi - 3 \text{ ft}/\text{sec}$
- (E) $\pi + 3 \text{ ft}/\text{sec}$

Use the following figure for questions 6 – 7.

The figure to the right shows the velocity of a moving object as a function of time. The object is located at the origin for $t = 0$.

6) At which point is the object farthest to the right?

- (A) A
- (B) B
- (C) C
- (D) D
- (E) E



7) At which point is the object farthest from the origin?

- (A) A
- (B) B
- (C) C
- (D) D
- (E) E

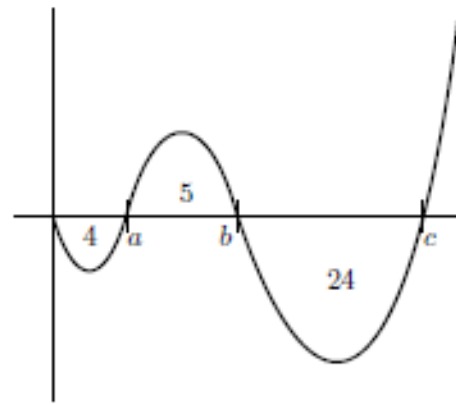
8. A particle moves along the x-axis. Its initial position at $t = 0$ sec is $x(0) = 15$. The graph below shows the particle's velocity $v(t)$. The numbers are areas of the enclosed figures.

(a) What is the particle's displacement between $t = 0$ and $t = c$?

(b) What is the total distance traveled by the particle in the same time period?

(c) Give the positions of the particle at times a , b , and c .

(d) Approximately where does the particle achieve its greatest positive acceleration on the intervals $[0, b]$ and $[0, c]$?



9. The rate at which water flows out of a pipe, in gallons per hour, is given by a differentiable function R of time t . The table shown below gives the rate as measured every 3 hours for a 24-hour period.

(a) Use a midpoint Riemann sum with 4 subdivisions of equal length to approximate $\int R(t)dt$ on the interval from 0 to 24. Using correct units, explain the meaning of your answer in terms of water flow.

(b) Is there some time t , $0 < t < 24$ such that $R'(t) = 0$? Justify your answer.

t (hours)	$R(t)$ (gallons per hour)
0	9.6
3	10.4
6	10.8
9	11.2
12	11.4
15	11.3
18	10.7
21	10.2
24	9.6