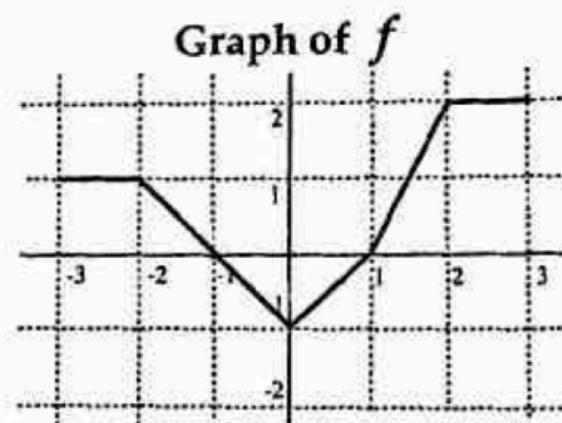


- 9 The function f is continuous for $-3 \leq x \leq 3$. The graph of f shown in the figure consists of five line segments. What is the average value of f on the interval $-3 \leq x \leq 3$.

- (A) $\frac{1}{2}$
(B) $\frac{7}{6}$
(C) $\frac{7}{12}$
(D) $\frac{11}{12}$
(E) $\frac{3}{2}$



Ans

13. What is the average value of $2t^3 - 3t^2 + 4$ over the interval $-1 \leq t \leq 1$?

(A) 0

(B) $\frac{7}{4}$

(C) 3

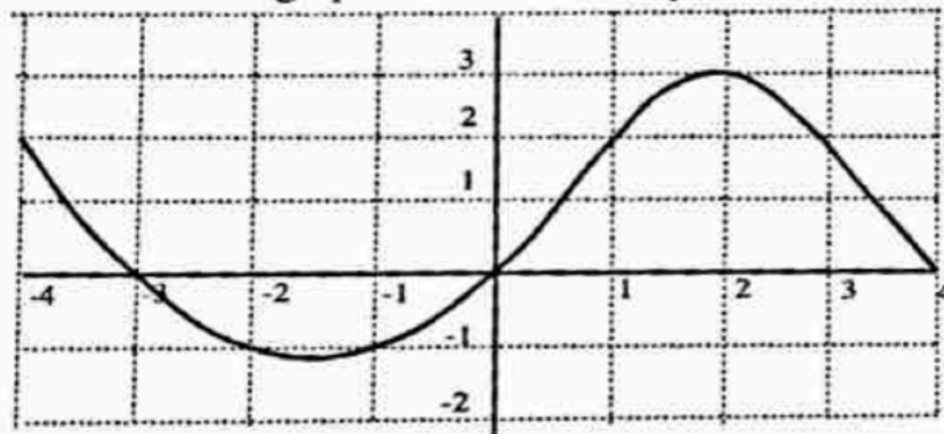
(D) 4

(E) 6

Ans

11. The graph of a function f whose domain is the interval $[-4, 4]$ is shown in the figure. If the graph of f has horizontal tangents at $x = -1.5$ and 2 , which of the following statements are true?

the graph of the function f



I. The average rate of change of f over the interval from $x = -2$ to $x = 3$ is $\frac{1}{5}$.

II. The slope of the tangent line at the point where $x = 2$ is 0 .

III. The left-sum approximation of $\int_{-1}^3 f(t) dt$ with 4 equal subdivisions is 4.

- A) I only (B) I and II only (C) II and III only (D) I and III only (E) I, II, III

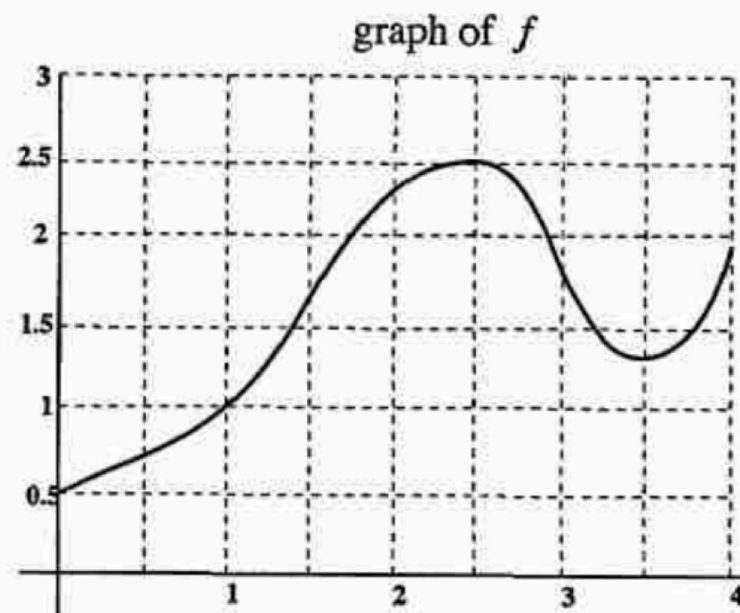
7. A graph of the function f is shown at the right.

Which of the following statements are true?

I. $f(1) > f'(3)$

II. $\int_1^2 f(x) dx > f'(3.5)$

III. $\lim_{h \rightarrow 0} \frac{f(2+h) - f(2)}{h} > \frac{f(2.5) - f(2)}{2.5 - 2}$



(A) I only

(B) II only

(C) I and II only

(D) II and III only

(E) I, II, III

Ans

10. The average value of $f(x) = e^{2x} + 1$ on the interval $0 \leq x \leq \frac{1}{2}$ is

- (A) e (B) $\frac{e}{2}$ (C) $\frac{e}{4}$ (D) $2e - 1$ (E) $\frac{e^{2x} + 1}{2}$

Ans

2. The *average* rate of change of the function $f(x) = \int_0^x \sin(t^2) dt$ over the interval $[1, 3]$ is

(A) 0.216

(B) 0.232

(C) 0.248

(D) 0.264

(E) 0.280

Ans

8. The average rate of change of the function $f(x) = \int_0^x \sqrt{1 + \cos(t^2)} dt$ over the interval $[1, 3]$ is nearest to

- (A) 0.846
- (B) 0.858
- (C) 0.870
- (D) 0.882
- (E) 0.894

10. The average rate of change of the function $f(x) = x^2 - \frac{1}{e^x}$ over the interval $[0, 3]$ equals the instantaneous rate of change of f at $x =$

- (A) 0.313 (B) 1.553 (C) 2.573 (D) 3.317 (E) 9.950

6. If $\frac{dy}{dx} = \sqrt{2x+1}$, then the average rate of change y with respect to x on the closed interval $[0, 4]$ is
- (A) 13 (B) $\frac{9}{2}$ (C) $\frac{13}{2}$ (D) $\frac{13}{6}$ (E) $\frac{1}{9}$

12. The functions f and g are defined on the closed interval $[0, b]$ by $f(x) = \cos(2x)$ and $g(x) = e^x - 1$. They will have the same average value if b is
- (A) 0.846 (B) 0.850 (C) 0.854 (D) 0.858 (E) 0.862

24. The average value of $\sec^2 x$ over the interval $0 \leq x \leq \frac{\pi}{4}$ is

(A) $\frac{\pi}{4}$

(B) $\frac{4}{\pi}$

(C) $\frac{\pi}{8}$

(D) 1

(E) none of the above

Ans



12. The functions f and g are defined on the closed interval $[0, b]$ by $f(x) = \cos(2x)$ and $g(x) = e^x - 1$. They will have the same average value if b is

(A) 0.846

(B) 0.850

(C) 0.854

(D) 0.858

(E) 0.862

Ans

11. The average (mean) value of $\frac{1}{x}$ over the interval $1 \leq x \leq e$ is

- (A) 1 (B) $\frac{1}{e}$ (C) $\frac{1}{e^2} - 1$ (D) $\frac{1+e}{2}$ (E) $\frac{1}{e-1}$

Ans

15. If the average value of $y = x^2$ over the interval $[1, b]$ is $\frac{13}{3}$, then the value of b could be

(A) $\frac{7}{3}$

(B) 3

(C) $\frac{11}{3}$

(D) 4

(E) $\frac{13}{3}$

4. The average rate of change of the differentiable function f from $(3, f(3))$ to $(x, f(x))$ is given by $\frac{x^2 - x - 6}{x - 3}$. The value of $f'(3)$ is

- (A) 0
- (B) 1
- (C) 3
- (D) 5
- (E) undefined

Ans

2. For $f(x) = \sin^2 x$ and $g(x) = 0.5x^2$ on the interval $\left[-\frac{\pi}{2}, \frac{\pi}{2}\right]$, the instantaneous rate of change of f is greater than the instantaneous rate of change of g for which value of x ?
- (A) -0.8 (B) 0 (C) 0.9 (D) 1.2 (E) 1.5