SAT PREP

Assignment : AP CALCULUS BC TEST (Differentiation)

1. At how many points on the interval [–5,5] is a tangent to $y = x + \cos x$ parallel to the secant line?

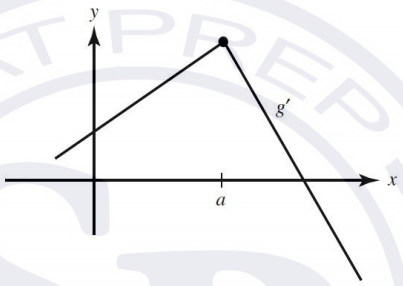
(A) none **(B)** 1 **(C)** 2 **(D)** 3 **(E)** more than 3

2. From the values of f shown, estimate $f'(2)$.

x	1.92	1.94	1.96	1.98	2.00
$f(x)$	6.00	5.00	4.40	4.10	4.00

(A) –0.10 **(B)** –0.20 **(C)** –5 **(D)** –10 **(E)** –25

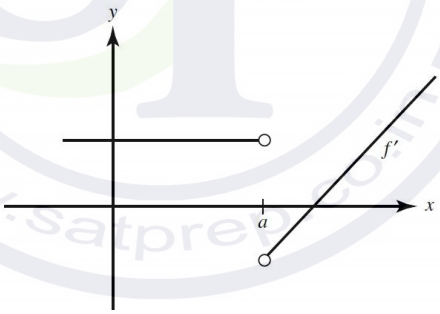
3. The graph of g' is shown here. Which of the following statements is (are) true of g at $x = a$?



I. g is continuous.
II. g is differentiable.
III. g is increasing.

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

4. A function f has the derivative shown. Which of the following statements must be false?



(A) f is continuous at $x = a$.
(B) $f(a) = 0$.
(C) f has a vertical asymptote at $x = a$.
(D) f has a jump discontinuity at $x = a$.
(E) f has a removable discontinuity at $x = a$.

5. The table below shows some points on a function f that is both continuous and differentiable on the closed interval [2,10].

x	2	4	6	8	10
$f(x)$	30	25	20	25	30

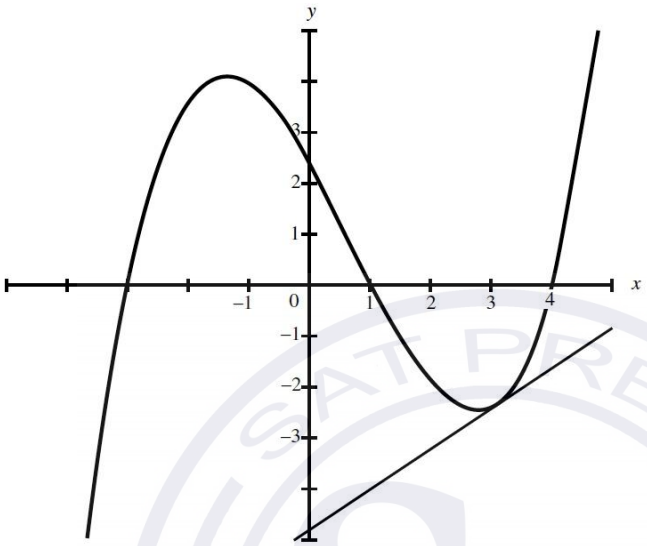
Which must be true?

(A) $f(x) > 0$ for $2 < x < 10$
(B) $f'(6) = 0$
(C) $f'(8) > 0$
(D) The maximum value of f on the interval [2,10] is 30.
(E) For some value of x on the interval [2,10] $f'(x) = 0$.

6. If f is differentiable and difference quotients overestimate the slope of f at $x = a$ for all $h > 0$, which must be true?

(A) $f'(a) > 0$ **(B)** $f'(a) < 0$ **(C)** $f''(a) > 0$
(D) $f''(a) < 0$ **(E)** none of these

Use this graph of $y = f(x)$ for Questions 87 and 88.



7. $f'(3)$ is most closely approximated by

(A) 0.3 **(B)** 0.8 **(C)** 1.5 **(D)** 1.8 **(E)** 2

8. The rate of change of $f(x)$ is least at $x \simeq$

(A) –3 **(B)** –1.3 **(C)** 0 **(D)** 0.7 **(E)** 2.7

9. If $y = \sqrt{x^2 + 1}$, then the derivative of y^2 with respect to x^2 is

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

10 If $x = t^2 - 1$ and $y = t^4 - 2t^3$, then, when $t = 1$, $\frac{d^2y}{dx^2}$ is

(A) 1 **(B)** –1 **(C)** 0 **(D)** 3 **(E)** $\frac{1}{2}$

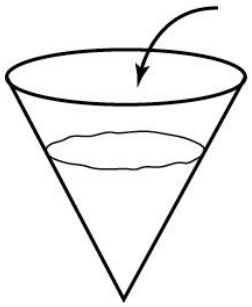
11 $\lim_{x\to\infty} \frac{e^x}{x^{50}}$ equals

(A) 0 **(B)** 1 **(C)** $\frac{1}{50!}$ **(D)** ∞ **(E)** none of these

12 The graph in the xy-plane represented by $x = 3 + 2 \sin t$ and $y = 2 \cos t - 1$, for $-\pi \leq t \leq \pi$, is

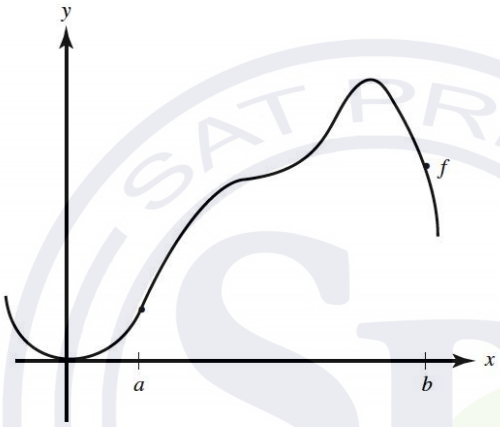
(A) a semicircle **(B)** a circle **(C)** an ellipse
(D) half of an ellipse **(E)** a hyperbola

13 Water is poured into a conical reservoir at a constant rate. If $h(t)$ is the rate of change of the depth of the water, then h is



(A) constant
(B) linear and increasing
(C) linear and decreasing
(D) nonlinear and increasing
(E) nonlinear and decreasing

14 At how many points on the interval $[a,b]$ does the function graphed satisfy the Mean Value Theorem?



(A) none **(B)** 1 **(C)** 2 **(D)** 3 **(E)** 4

15 $\lim_{x\to\infty} x^2 \sin\frac{1}{x}$

(A) is 1 **(B)** is 0 **(C)** is ∞
(D) oscillates between -1 and 1 **(E)** is none of these

16 The table gives the values of a function f that is differentiable on the interval $[0,1]$:

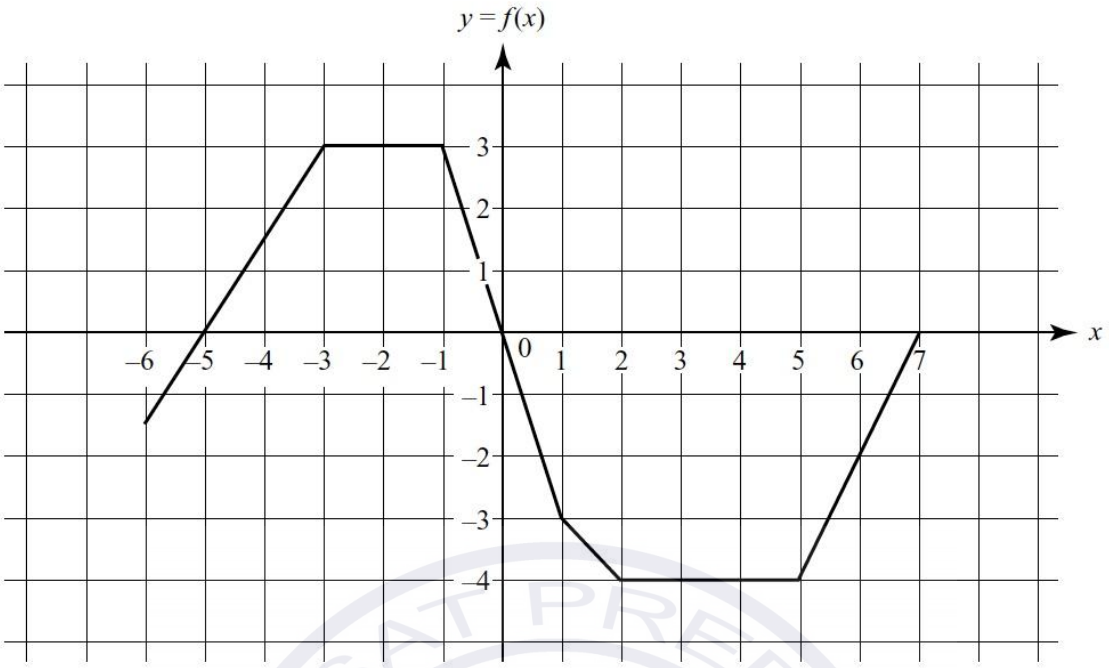
x	0.10	0.20	0.30	0.40	0.50	0.60
$f(x)$	0.171	0.288	0.357	0.384	0.375	0.336

According to this table, the best approximation of $f'(0.10)$ is

(A) 0.12 **(B)** 1.08 **(C)** 1.17 **(D)** 1.77 **(E)** 2.88

17 Suppose $y = f(x) = 2x^3 - 3x$. If $h(x)$ is the inverse function of f, then $h'(-1) =$

(A) -1 **(B)** $\frac{1}{5}$ **(C)** $\frac{1}{3}$ **(D)** 1 **(E)** 3



18 On the interval $1 < x < 2$, $f(x)$ equals

(A) $-x-2$ **(B)** $-x-3$ **(C)** $-x-4$ **(D)** $-x+2$ **(E)** $x-2$

19 Over which of the following intervals does $f'(x)$ equal zero?

I. $(-6,-3)$ II. $(-3,-1)$ III. $(2,5)$

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

20 For $-6 < x < -3$, $f'(x)$ equals

(A) $-\frac{3}{2}$ **(B)** -1 **(C)** 1 **(D)** $\frac{3}{2}$ **(E)** 2

21 How many points of discontinuity does $f'(x)$ have on the interval $-6 < x < 7$?

(A) none **(B)** 2 **(C)** 3 **(D)** 4 **(E)** 5

22 Which of the following statements about the graph of $f'(x)$ is false?

(A) It consists of six horizontal segments.
(B) It has four jump discontinuities.
(C) $f'(x)$ is discontinuous at each x in the set $\{-3,-1,1,2,5\}$.
(D) $f'(x)$ ranges from -3 to 2.
(E) On the interval $-1 < x < 1$, $f'(x) = -3$.