

**AP CALCULUS  
FIVES 99.5**

1  $\lim_{x \rightarrow \infty} \frac{3x^2 - 4}{2 - 7x - x^2} =$  (A) 3 (B) 1 (C) -3 (D)  $\infty$  (E) 0

2  $\lim_{h \rightarrow 0} \frac{\cos\left(\frac{p}{2} + h\right)}{h} =$  (A) 1 (B) nonexistent (C) 0 (D) -1 (E) none of these

3. If, for all  $x$ ,  $f'(x) = (x-2)^4(x-1)^3$ , it follows that the function  $f$  has
- (A) a relative minimum at  $x = 1$   
 (B) a relative maximum at  $x = 1$   
 (C) both a relative minimum at  $x = 1$  and a relative maximum at  $x = 2$   
 (D) neither a relative maximum nor a relative minimum  
 (E) relative minima at  $x = 1$  and at  $x = 2$

4. Let  $F(x) = \int_0^x \frac{10}{1+e^t} dt$ . Which of the following statements are true?

- I.  $F'(0) = 5$     II.  $F(2) < F(6)$     III.  $F$  is concave upward  
 (A) I only    (B) II only    (C) III only    (D) I and II    (E) I and III

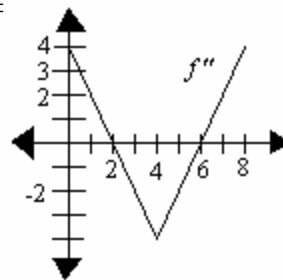
5. If  $f(x) = 10^x$  and  $10^{1.04} \cong 10.96$ , which is closest to  $f'(1)$ ?  
 (A) 0.24 (B) 0.92 (C) 0.96 (D) 10.5 (E) 24

6. If  $f$  is differentiable, we can use the line tangent to  $f$  at  $x = a$  to approximate values of  $f$  near  $x = a$ . Suppose this method always underestimates the correct values. If so, then at  $x = a$ ,  $f$  must be: (A) positive (B) increasing (C) decreasing (D) concave upward (E) concave downward

7. If  $f(x) = (\cos x)\sin 3x$ , then  $f'\left(\frac{p}{6}\right) =$  (A)  $\frac{1}{2}$  (B)  $-\frac{\sqrt{3}}{2}$  (C) 0 (D) 1 (E)  $-\frac{1}{2}$

8.  $\int_0^1 \frac{x \, dx}{x^2 + 1} =$  (A)  $\frac{p}{4}$  (B)  $\ln \sqrt{2}$  (C)  $\frac{1}{2}(\ln 2 - 1)$  (D)  $\frac{3}{2}$  (E)  $\ln 2$

9. The graph of  $f''$  is shown below. If  $f'(1) = 0$ , then  $f'(x) = 0$  at  $x =$   
 (A) 0 (B) 2 (C) 3 (D) 4 (E) 7



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The table shows the values of differentiable functions  $f$  and  $g$ , for questions 10 and 11

$x$	$f$	$f'$	$g$	$g'$
1	2	0.5	-3	5
2	3	1	0	4
3	4	2	2	3
4	6	4	3	0.5

10. If  $P(x) = g^2(x)$ , then  $P'(3) =$  (A) 4 (B) 6 (C) 9 (D) 12 (E) 18

11. If  $H(x) = f^{-1}(x)$ , then  $H'(3) =$  (A)  $-\frac{1}{16}$  (B)  $-\frac{1}{8}$  (C)  $-\frac{1}{2}$  (D)  $\frac{1}{2}$  (E) 1

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12. The total area of the region bounded by the graph of  $y = x\sqrt{1-x^2}$  and the  $x$ -axis is

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

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13. The curve of  $y = \frac{1-x}{x-3}$  is concave up only when (A)  $x > 3$  (B)  $1 < x < 3$  (C)  $x > 1$  (D)  $x < 1$  (E)  $x < 3$

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14. The area of the largest isosceles triangles that can be drawn with one vertex at the origin and with the others on a line parallel to and above the  $x$ -axis and on the curve  $y = 27 - x^2$  is:

- A) 108    B) 27    C)  $12\sqrt{3}$     D) 54    E)  $24\sqrt{3}$

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15. The average (mean) value of  $\tan x$  on the interval from  $x = 0$  to  $x = \frac{p}{3}$  is

- A)  $\ln 2$     B)  $\frac{3}{p} \ln 2$     C)  $\ln \frac{1}{2}$     D)  $\frac{9}{p}$     E)  $\frac{\sqrt{3}}{2}$
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