

AP Calculus - Calculator MC Questions

1)

Let g be the function given by $g(x) = \int_0^x \sin(t^2) dt$ for $-1 \leq x \leq 3$. On which of the following intervals is g decreasing?

- (A) $-1 \leq x \leq 0$
- (B) $0 \leq x \leq 1.772$
- (C) $1.253 \leq x \leq 2.171$
- (D) $1.772 \leq x \leq 2.507$
- (E) $2.802 \leq x \leq 3$

2)

A particle moves along the x -axis so that at any time $t > 0$, its acceleration is given by $a(t) = \ln(1 + 2^t)$. If the velocity of the particle is 2 at time $t = 1$, then the velocity of the particle at time $t = 2$ is

- (A) 0.462
- (B) 1.609
- (C) 2.555
- (D) 2.886
- (E) 3.346

3)

The function f has first derivative given by $f'(x) = \frac{\sqrt{x}}{1+x+x^3}$. What is the x -coordinate of the inflection point of the graph of f ?

- (A) 1.008
- (B) 0.473
- (C) 0
- (D) -0.278
- (E) The graph of f has no inflection point.

4)

The velocity, in ft/sec, of a particle moving along the x -axis is given by the function $v(t) = e^t + te^t$. What is the average velocity of the particle from time $t = 0$ to time $t = 3$?

- (A) 20.086 ft/sec
- (B) 26.447 ft/sec
- (C) 32.809 ft/sec
- (D) 40.671 ft/sec
- (E) 79.342 ft/sec

5)

Let f be the function with derivative given by $f'(x) = \sin(x^2 + 1)$. How many relative extrema does f have on the interval $2 < x < 4$?

- (A) One
- (B) Two
- (C) Three
- (D) Four
- (E) Five

6)

A particle moves along the x -axis so that at any time $t \geq 0$, its velocity is given by $v(t) = 3 + 4.1 \cos(0.9t)$. What is the acceleration of the particle at time $t = 4$?

- (A) -2.016
- (B) -0.677
- (C) 1.633
- (D) 1.814
- (E) 2.978

7)

The rate of change of the altitude of a hot-air balloon is given by $r(t) = t^3 - 4t^2 + 6$ for $0 \leq t \leq 8$. Which of the following expressions gives the change in altitude of the balloon during the time the altitude is decreasing?

(A) $\int_{1.572}^{3.514} r(t) dt$

(B) $\int_0^8 r(t) dt$

(C) $\int_0^{2.667} r(t) dt$

(D) $\int_{1.572}^{3.514} r'(t) dt$

(E) $\int_0^{2.667} r'(t) dt$

8)

At time $t \geq 0$, the acceleration of a particle moving on the x -axis is $a(t) = t + \sin t$. At $t = 0$, the velocity of the particle is -2 . For what value t will the velocity of the particle be zero?

- (A) 1.02 (B) 1.48 (C) 1.85 (D) 2.81 (E) 3.14

9)

If the derivative of f is given by $f'(x) = e^x - 3x^2$, at which of the following values of x does f have a relative maximum value?

- (A)
- -0.46
- (B)
- 0.20
- (C)
- 0.91
- (D)
- 0.95
- (E)
- 3.73

10)

Let f be the function given by $f(x) = 2e^{4x^2}$. For what value of x is the slope of the line tangent to the graph of f at $(x, f(x))$ equal to 3?

- (A)
- 0.168
- (B)
- 0.276
- (C)
- 0.318
- (D)
- 0.342
- (E)
- 0.551

11)

The graph of the function $y = x^3 + 6x^2 + 7x - 2 \cos x$ changes concavity at $x =$

- (A)
- -1.58
- (B)
- -1.63
- (C)
- -1.67
- (D)
- -1.89
- (E)
- -2.33

12)

Let $F(x)$ be an antiderivative of $\frac{(\ln x)^3}{x}$. If $F(1) = 0$, then $F(9) =$

- (A)
- 0.048
- (B)
- 0.144
- (C)
- 5.827
- (D)
- 23.308
- (E)
- $1,640.250$

13)

The first derivative of the function f is given by $f'(x) = \frac{\cos^2 x}{x} - \frac{1}{5}$. How many critical values does f have on the open interval $(0,10)$?

- (A) One
- (B) Three
- (C) Four
- (D) Five
- (E) Seven

14)

Let f be the function given by $f(x) = 3e^{2x}$ and let g be the function given by $g(x) = 6x^3$. At what value of x do the graphs of f and g have parallel tangent lines?

- (A) -0.701
- (B) -0.567
- (C) -0.391
- (D) -0.302
- (E) -0.258

15)

The first derivative of the function f is defined by $f'(x) = \sin(x^3 - x)$ for $0 \leq x \leq 2$. On what interval(s) is f increasing?

- (A) $1 \leq x \leq 1.445$
- (B) $1 \leq x \leq 1.691$
- (C) $1.445 \leq x \leq 1.875$
- (D) $0.577 \leq x \leq 1.445$ and $1.875 \leq x \leq 2$
- (E) $0 \leq x \leq 1$ and $1.691 \leq x \leq 2$

16)

The derivative of the function f is given by $f'(x) = x^2 \cos(x^2)$. How many points of inflection does the graph of f have on the open interval $(-2, 2)$?

- (A) One
- (B) Two
- (C) Three
- (D) Four
- (E) Five

17)

A particle moves along a straight line with velocity given by $v(t) = 7 - (1.01)^{-t^2}$ at time $t \geq 0$. What is the acceleration of the particle at time $t = 3$?

- (A) -0.914
- (B) 0.055
- (C) 5.486
- (D) 6.086
- (E) 18.087

18)

An object traveling in a straight line has position $x(t)$ at time t . If the initial position is $x(0) = 2$ and the velocity of the object is $v(t) = \sqrt[3]{1+t^2}$, what is the position of the object at time $t = 3$?

- (A) 0.431 (B) 2.154 (C) 4.512 (D) 6.512 (E) 17.408

19)

What is the average value of $y = \frac{\cos x}{x^2 + x + 2}$ on the closed interval $[-1, 3]$?

- (A) -0.085 (B) 0.090 (C) 0.183 (D) 0.244 (E) 0.732

20)

A particle moves along the x -axis so that its velocity at any time $t \geq 0$ is given by $v(t) = 5te^{-t} - 1$. At $t = 0$, the particle is at position $x = 1$. What is the total distance traveled by the particle from $t = 0$ to $t = 4$?

- (A) 0.366 (B) 0.542 (C) 1.542 (D) 1.821 (E) 2.821

Answers

1. d
2. e
3. b
4. a
5. d
6. c
7. a

8. b
9. c
10. a
11. d
12. c
13. b
14. c

15. b
16. e
17. b
18. d
19. c
20. d