AP Calculus AB: 19 MC Questions

AP Calculus AB **Name**_____

Record your answers in the following table. Show work for full credit.

1:		**6:**		**11:**		**16:**	
2:		**7:**		**12:**		**17:**	
3:		**8:**		**13:**		**18:**	
4:		**9:**		**14:**		**19:**	
5:		**10:**		**15:**			

1. The slope of the line normal to the graph of $y = 2\ln(\sec x)\ at\ x = \frac{\pi}{4}$ is

(A) –2 (B) $-\frac{1}{2}$ (C) $\frac{1}{2}$ (D) 2 (E) nonexistent

2. An equation of the line tangent to the graph of $y = \frac{2x+3}{3x-2}$ at the point (1, 5) is

(A) $13x - y = 8$ (B) $13x + y = 18$ (C) $x - 13y = 64$
(D) $x + 13y = 66$ (E) $-2x + 3y = 13$

3. If $f(x) = (x^2 - 2x - 1)^{\frac{2}{3}}$, *then* $f'(0)$ *is*

(A) $\frac{4}{3}$ (B) 0 (C) $-\frac{2}{3}$ (D) $-\frac{4}{3}$ (E) –2

4. If $f(x) = e^{3\ln(x^2)}$, *then* $f'(x) =$

(A) $e^{3\ln(x^2)}$ (B) $\frac{3}{x^2}e^{3\ln(x^2)}$ (C) $6(\ln x)e^{3\ln(x^2)}$ (D) $5x^4$ (E) $6x^5$

5. If $x^3 + 3xy + 2y^3 = 17$, then in terms of x *and* y, $\frac{dy}{dx} =$

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

6. $\frac{d}{dx}(2^x) =$

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

7. A particle moves along a line so that at time t , where $0 \le t \le \pi$, its position is given by $s(t) = -4\cos t - \frac{t^2}{2} + 10$. What is the velocity of the particle when its acceleration is zero?

(A) –5.19 (B) 0.74 (C) 1.32 (D) 2.55 (E) 8

8. If f is a differentiable function, then $f'(a)$ is given by which of the following?

I. $\lim_{h \to 0} \frac{f(a+h) - f(a)}{h}$

II. $\lim_{x \to a} \frac{f(x) - f(a)}{x - a}$

III. $\lim_{x \to a} \frac{f(x+h) - f(x)}{h}$

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

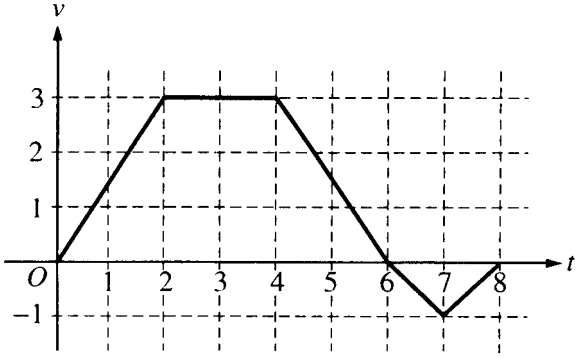
9. $\int_1^2 (4x^3 - 6x)\,dx =$

(A) 2 (B) 4 (C) 6 (D) 36 (E) 42

10. $\frac{1}{2}\int e^{\frac{t}{2}}\,dt =$

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

Questions 11-12 refer to the following situation: A bug begins to crawl up a vertical wire at time $t = 0$. The velocity v of the bug at time t, $0 \le t \le 8$, is given by the function whose graph is shown below.



11. At what value of t does the bug change direction?

(A) 2 (B) 4 (C) 6 (D) 7 (E) 8

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

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

13. $\int_0^{\frac{\pi}{4}} \frac{e^{\tan x}}{\cos^2 x}\,dx$ is

(A) 0 (B) 1 (C) $e-1$ (D) e (E) $e+1$

14. $\int_0^1 \sqrt{x}\,(x+1)\,dx$

(A) 0 (B) 1 (C) $\frac{16}{15}$ (D) $\frac{7}{5}$ (E) 2

15. 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

x	0	0.5	1.0	1.5	2.0
$f(x)$	3	3	5	8	13

16. A table of values for a continuous function f is shown above. If four equal subintervals of [0,2] are used, which of the following is the midpoint approximation of $\int_0^2 f(x)dx$

(A) 9.5 (B) 11 (C)12 (D)14.5 (E)16

17.

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

18. $\int \frac{3x^2}{\sqrt{x^3+1}}\,dx =$

(A) $2\sqrt{x^3+1}+C$ (B) $\frac{3}{2}\sqrt{x^3+1}+C$ (C) $\sqrt{x^3+1}+C$

(D) $\ln\sqrt{x^3+1}+C$ (E) $\ln(x^3+1)+C$

19. $\int (x^2+1)^2\,dx =$

(A) $\frac{(x^2+1)^3}{3}+C$ (B) $\frac{(x^2+1)^3}{6x}+C$ (C) $\left(\frac{x^3}{3}+x\right)^2+C$

(D) $\frac{2x(x^2+1)^3}{3}+C$ (E) $\frac{x^5}{5}+\frac{2x^3}{3}+x+C$

19 AP Calculus AB Problems: Answer Key

1	B	5	A	9	C	13	C	17	E
2	B	6	C	10	C	14	C	18	A
3	A	7calc	D	11	C	15calc	B	19	E
4	E	8	C	12	B	16	C		