APCalcBC-HomeworkQuiz-#4

1. If $y = \arctan(\cos x)$, then $\frac{dy}{dx}$ =

(A) $\frac{-\sin x}{1+\cos^2 x}$

(B) $-(\text{arcsec}(\cos x))^2 \sin x$

(C) $(\text{arcsec}(\cos x))^2$

(D) $\frac{1}{(\arccos x)^2+1}$

(E) $\frac{1}{1+\cos^2 x}$

2. $\int x^2 \cos(x^3) dx =$

(A) $-\frac{1}{3}\sin(x^3) + C$

(B) $\frac{1}{3}\sin(x^3) + C$

(C) $-\frac{x^3}{3}\sin(x^3) + C$

(D) $\frac{x^3}{3}\sin(x^3) + C$

(E) $\frac{x^3}{3}\sin\left(\frac{x^4}{4}\right) + C$

3. $\lim_{x\to\infty} \frac{x^3-2x^2+3x-4}{4x^3-3x^2+2x-1} =$

(A) 4

(B) 1

(C) 1/4

(D) 0

(E) -1

4. The third-degree Taylor polynomial about $x = 0$ of $\ln(1 - x)$ is

(A) $-x - \frac{x^2}{2} - \frac{x^3}{3}$

(B) $1 - x + \frac{x^2}{2}$

(C) $x - \frac{x^2}{2} + \frac{x^3}{3}$

(D) $-1 + x - \frac{x^2}{2}$

(E) $-x + \frac{x^2}{2} - \frac{x^3}{3}$

5. If $y = \frac{\ln x}{x}$, then $\frac{dy}{dx} =$

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(A) $\frac{1}{x}$

(B) $\frac{1}{x^2}$

(C) $\frac{\ln x - 1}{x^2}$

(D) $\frac{1 - \ln x}{x^2}$

(E) $\frac{1 + \ln x}{x^2}$

6. A pizza, heated to a temperature of 350 degrees Fahrenheit (^{o}F) is taken out of an oven and placed in a (75^{o}F) room at time $t = 0$ minutes. The temperature of the pizza is changing at a rate of $-110e^{-0.4t}$ degrees Fahrenheit per minute. To the nearest degree, what is the temperature of the pizza at time $t = 5$ minutes?

(A) 112^{o}F

(B) 119^{o}F

(C) 147^{o}F

(D) 238^{o}F

(E) 335^{o}F

7. $\int \frac{7x}{(2x-3)(x+2)}dx =$

(A) $\frac{3}{2}\ln|2x-3| + 2\ln|x+2| + C$

(B) $3\ln|2x-3| + 2\ln|x+2| + C$

(C) $3\ln|2x-3| - 2\ln|x+2| + C$

(D) $-\frac{6}{(2x-3)^2} - \frac{2}{(x+2)^2} + C$

(E) $-\frac{3}{(2x-3)^2} - \frac{2}{(x+2)^2} + C$

8.

x	2	3	5	8	13
$f(x)$	6	–2	–1	3	9

The function f is continuous on the closed interval $[2, 13]$ and has values as shown in the table above. Using the intervals $[2, 3]$, $[3, 5]$, $[5, 8]$, and $[8, 13]$ what is the approximation of $\int_2^{13} f(x)dx$ obtained from a left Riemann sum?

(A) 6

(B) 14

(C) 28

(D) 32

(E) 50

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9.

What is the area enclosed by the curves $y = x^3 - 8x^2 + 18x - 5$ and $y = x + 5$?

(A) 10.667

(B) 11.833

(C) 14.583

(D) 21.333

(E) 32

10. The top of a 25-foot ladder is sliding down a vertical wall at a constant rate of 3 feet per minute. When the top of the ladder is 7 feet from the ground, what is the rate of change of the distance between the bottom of the ladder and the wall?

(A) $-\frac{7}{8}$ feet per minute

(B) $-\frac{7}{24}$ feet per minute

(C) $\frac{7}{24}$ feet per minute

(D) $\frac{7}{8}$ feet per minute

(E) $\frac{21}{25}$ feet per minute

11. The length of the path described by the parametric equations $x = \cos^3 t$ and $y = \sin^3 t$, for $0 \le t \le \frac{\pi}{2}$ is given by

(A) $\int_0^{\frac{\pi}{2}} \sqrt{3\cos^2 t + 3\sin^2 t}\, dt$

(B) $\int_0^{\frac{\pi}{2}} \sqrt{-3\cos^2 t \sin t + 3\sin^2 t \cos t}\, dt$

(C) $\int_0^{\frac{\pi}{2}} \sqrt{9\cos^4 t + 9\sin^4 t}\, dt$

(D) $\int_0^{\frac{\pi}{2}} \sqrt{9\cos^4 t \sin^2 t + 9\sin^4 t \cos^2 t}\, dt$

(E) $\int_0^{\frac{\pi}{2}} \sqrt{\cos^6 t + \sin^6 t}\, dt$

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12. Which of the following series diverge?

I. $\sum_{n=0}^{\infty} \left(\frac{\sin 2}{\pi} \right)^n$

II. $\sum_{n=1}^{\infty} \frac{1}{\sqrt[3]{n}}$

III. $\sum_{n=1}^{\infty} \left(\frac{e^n}{e^n + 1} \right)$

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

13. The region *R* in the first quadrant is enclosed by the lines $x=0$ and $y=5$ and the graph of $y = x^2 + 1$. The volume of the solid generated when *R* is revolved about the *y*-axis is

(A) 6π
(B) 8π
(C) 34π/3
(D) 16π
(E) 544π/15

14. A curve is described by the parametric equations $x = t^2 + 2t$ and $y = t^3 + t^2$. An equation of the line tangent to the curve at the point determined by $t = 1$ is

(A) $2x - 3y = 0$
(B) $4x - 5y = 2$
(C) $4x - y = 10$
(D) $5x - 4y = 7$
(E) $5x - y = 13$

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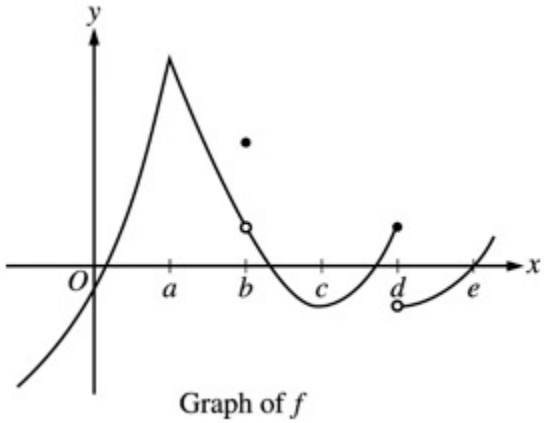
15.



Graph of f

The graph of a function f is shown above. At which value of x is f continuous, but not differentiable?

(A) a
(B) b
(C) c
(D) d
(E) e

16. $\int_1^{\infty} \frac{x}{(1+x^2)^2} dx$ is

(A) $-\frac{1}{2}$
(B) $-\frac{1}{4}$
(C) $\frac{1}{4}$
(D) $\frac{1}{2}$
(E) divergent

17. If $y = \cos^2 3x$, then dy/dx=

(A) -6 sin 3x cos 3x
(B) -2 cos 3x
(C) 2 cos 3x
(D) 6 cos 3x
(E) 2 sin 3x cos 3x

18. A rectangular area is to be enclosed by a wall on one side and fencing on the other three sides. If 18 meters of fencing are used, what is the maximum area that can be enclosed?

(A) $\frac{9}{2}\,m^2$

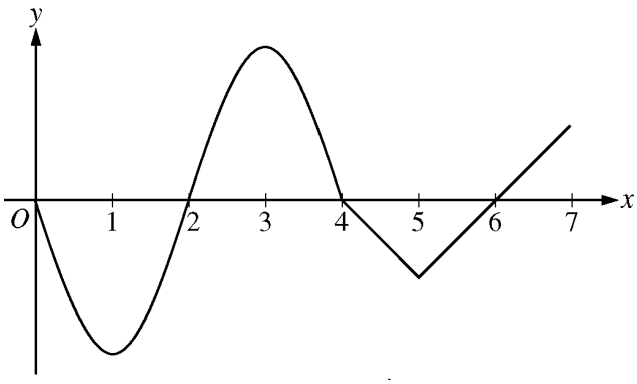
(B) $\frac{81}{4}\,m^2$

(C) $27\,m^2$

(D) $40\,m^2$

(E) $\frac{81}{2}\,m^2$

19.



Graph of f'

The graph of f', the derivative of the function f is shown above. On which of the following intervals is f decreasing?

(A) [2, 4] only

(B) [3, 5] only

(C) [0, 1] and [3, 5]

(D) [2, 4] and [6, 7]

(E) [0, 2] and [4, 6]

20. The velocity vector of a particle moving in the xy-plane has components given by $\frac{dx}{dt} = \sin\left(t^2\right)$ and $\frac{dy}{dt} = e^{\cos t}$. At time $t = 4$, the position of the particle is (2, 1). What is the y-coordinate of the position vector at time $t = 3$?

(A) 0.410

(B) 0.590

(C) 0.851

(D) 1.410

21. $\int xe^{2x}dx=$

(A) $xe^{2x}/2 - e^{2x}/4 + C$

(B) $xe^{2x}/2 - e^{2x}/2 + C$

(C) $xe^{2x}/2 + e^{2x}/4 + C$

(D) $xe^{2x}/2 + e^{2x}/2 + C$

(E) $x^2e^{2x}/4 + C$

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22. What is the general solution to the differential equation $\frac{dy}{dx} = \frac{x\cos(x^2)}{4y}$ for $y > 0$?

(A) $y = \frac{1}{2}\sqrt{\sin(x^2)} + C$

(B) $y = \sqrt{\frac{1}{4}\sin(x^2) + C}$

(C) $y = \frac{1}{8}\sin\left(x^2\right) + C$

(D) $y = Ce^{\frac{1}{8}\sin(x^2)}$

23. Let f be a differentiable function such that $f'(x) \geq 1$ for all x. If $a < b$, which of the following statements could be false?

(A) $\frac{f(b)-f(a)}{b-a} \geq 1$

(B) $f(b) > f(a)$

(C) There is a value c in the open interval (a, b) such that $f(c) = 0$.

(D) There is a value c in the open interval (a, b) such that $f(c) = \frac{f(a)+f(b)}{2}$.

24. The Taylor series for ln *x*, centered at *x*=1, is $\sum_{n=1}^{\infty} (-1)^{n+1} \frac{(x-1)^n}{n}$. Let *f* be the function given by the sum of the first three nonzero terms of this series. The maximum value of $|\ln x - f(x)|$ for $0.3 \leq x \leq 1.7$ is

(A) 0.030

(B) 0.039

(C) 0.145

(D) 0.153

(E) 0.529

25. For what value of k, if any, will $y = ke^{-2x} + 4\cos(3x)$ be a solution to the differential equation $y'' + 9y = 26e^{-2x}$?

(A) 2

(B) $\frac{13}{5}$

(C) 26

(D) There is no such value of k.