Calculus Course

Calculus Course

~~Row~~ #____

Full Name: ____________________

Period ______

Date: ________

[M]ultiple Choice Test # 4

★All work must be organized for credit.

01. (A) (B) (C) (D) (E)
02. (A) (B) (C) (D) (E)
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34. (A) (B) (C) (D) (E)
~~35. (A) (B) (C) (D) (E)~~
36. (A) (B) (C) (D) (E)
37. (A) (B) (C) (D) (E)
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~~42. (A) (B) (C) (D) (E)~~
~~43. (A) (B) (C) (D) (E)~~
~~44. (A) (B) (C) (D) (E)~~
~~45. (A) (B) (C) (D) (E)~~

Multiple Choice #4 AP CALCULUS AB

1. $y = e^{-x}\cos 2x$; $y' =$

(A) $-e^{-x}(\cos 2x + 2\sin 2x)$ (B) $e^{-x}(\sin 2x - \cos 2x)$
(C) $2e^{-x}\sin 2x$ (D) $-e^{-x}(\cos 2x + \sin 2x)$ (E) $-e^{-x}\sin 2x$

2. $y = \sin^{-1} x - \sqrt{1 - x^2}$; $y' =$

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

(E) $\frac{1}{\sqrt{1+x}}$

3. $y = \ln(\sec x + \tan x)$; $y' =$

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

(E) $-\frac{1}{\sec x + \tan x}$

4. If $\sin x = e^y$, $0 < x < \pi$, what is $\frac{dy}{dx}$ in terms of x?

(A) $-\tan x$ (B) $-\cot x$ (C) $\cot x$ (D) $\tan x$ (E) $\csc x$

5. If $f(x) = x^{\sin x}$ for $x > 0$, then $f'(x) =$

(A) $(\sin x)x^{\sin x - 1}$ (B) $x^{\sin x}(\cos x)(\ln x)$ (C) $\frac{\sin x}{x} + (\cos x)(\ln x)$

(D) $x^{\sin x}\left[\frac{\sin x}{x} + (\cos x)(\ln x)\right]$ (E) $x\cos x + \sin x$

6. $\frac{d}{dx}\int_0^{x^2} \cos^2(u)\,du$

(A) $\cos^2 x$ (B) $\cos^2 x^2$ (C) $\sin^2 x^2$ (D) $2x\cos^2 x^2$ (E) $x^2\cos^2 x^2$

7. $\lim_{h \to 0} \frac{\cos(h) - 1}{h}$ is

(A) -1 (B) 0 (C) 1 (D) ∞ (E) none of these

8. $\lim_{x \to 0} \dfrac{\sin x}{x^2 + 3x}$ is

(A) 1 (B) $\frac{1}{3}$ (C) 3 (D) ∞ (E) $\frac{1}{4}$

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9. $D_x \cos x^2 =$

(A) $2x \sin x^2$ (B) $-2x \sin x^2$ (C) $-2 \sin x \cos x$

(D) $-\sin x^2$ (E) $\sin 2x$

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10. $y = \dfrac{1}{2 \sin 2x}$; $D_x y =$

(A) $-\csc 2x \cot 2x$ (B) $\dfrac{1}{4 \cos 2x}$ (C) $-4 \csc 2x \cot 2x$

(D) $\dfrac{\cos 2x}{2\sqrt{\sin 2x}}$ (E) $-\csc^2 2x$

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11. If $y = \sin^3 (1 - 2x)$, then $\dfrac{dy}{dx}$ is

(A) $3 \sin^2 (1 - 2x)$ (B) $-2 \cos^3 (1 - 2x)$ (C) $-6 \sin^2 (1 - 2x)$

(D) $-6 \sin^2 (1 - 2x) \cos (1 - 2x)$ (E) $-6 \cos^2 (1 - 2x)$

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12. $\dfrac{d}{dx}$ [Arcsin $2x$] $=$

(A) $\dfrac{-1}{2\sqrt{1 - 4x^2}}$ (B) $\dfrac{-2}{\sqrt{4x^2 - 1}}$ (C) $\dfrac{1}{2\sqrt{1 - 4x^2}}$ (D) $\dfrac{2}{\sqrt{1 - 4x^2}}$

(E) $\dfrac{2}{\sqrt{4x^2 - 1}}$

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13. $y = x \tan^{-1} x - \ln \sqrt{x^2 + 1}$; $y' =$

(A) 0 (B) $\dfrac{1}{\sqrt{1 - x^2}} - \dfrac{x}{x^2 + 1}$ (C) $\tan^{-1} x$

(D) $\dfrac{x}{1 + x^2} + \tan^{-1} x - x$ (E) $\dfrac{1 - x}{1 + x^2}$

14. $\displaystyle\int \frac{dx}{1 + 4x^2} =$

(A) $\tan^{-1} (2x) + C$ (B) $\frac{1}{8} \ln (1 + 4x^2) + C$ (C) $\dfrac{1}{8(1 + 4x^2)^2} + C$

(D) $\frac{1}{2} \tan^{-1} (2x) + C$ (E) $\frac{1}{8x} \ln |1 + 4x^2| + C$

15. $\int \frac{x\,dx}{1 + 4x^2} =$

(A) $\frac{1}{8} \ln(1 + 4x^2) + C$ (B) $\frac{1}{8(1 + 4x^2)^2} + C$

(C) $\frac{1}{4}\sqrt{1 + 4x^2} + C$ (D) $\frac{1}{2} \ln|1 + 4x^2| + C$ (E) $\frac{1}{2} \tan^{-1} 2x + C$

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16. $\int \frac{x\,dx}{\sqrt{1 + 4x^2}} =$

(A) $\frac{1}{8}\sqrt{1 + 4x^2} + C$ (B) $\frac{\sqrt{1 + 4x^2}}{4} + C$ (C) $\frac{1}{2} \sin^{-1} 2x + C$

(D) $\frac{1}{2} \tan^{-1} 2x + C$ (E) $\frac{1}{8} \ln \sqrt{1 + 4x^2} + C$

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17. $\int xe^{-x}\,dx =$

(A) $e^{-x}(1 - x) + C$ (B) $\frac{e^{1-x}}{1 - x} + C$ (C) $-e^{-x}(x + 1) + C$

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

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18. $\int \frac{\tan^{-1} y}{1 + y^2}\,dy =$

(A) $\sec^{-1} y + C$ (B) $(\tan^{-1} y)^2 + C$ (C) $\ln(1 + y^2) + C$
(D) $\ln(\tan^{-1} y) + C$ (E) none of these

19. If the function f has a continuous derivative on $[0, c]$, then $\int_0^c f'(x)\,dx =$

(A) $f(c) - f(0)$ (B) $|f(c) - f(0)|$ (C) $f(c)$ (D) $f(x) + c$ (E) $f''(c) - f''(0)$

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20. $\int \cos 3x\,dx =$

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

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

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21. If $\frac{dy}{dx} = \tan x$, then $y =$

(A) $\frac{1}{2} \tan^2 x + C$ (B) $\sec^2 x + C$ (C) $\ln|\sec x| + C$ (D) $\ln|\cos x| + C$

(E) $\sec x \tan x + C$

22. $\int e^{2\theta} \sin e^{2\theta}\, d\theta =$

(A) $\cos e^{2\theta} + C$ (B) $2e^{4\theta}(\cos e^{2\theta} + \sin e^{2\theta}) + C$

(C) $-\frac{1}{2}\cos e^{2\theta} + C$ (D) $-2\cos e^{2\theta} + C$ (E) none of these

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23. $\int \tan\theta\, d\theta =$

(A) $-\ln|\sec\theta| + C$ (B) $\sec^2\theta + C$ (C) $\ln|\sin\theta| + C$

(D) $\sec\theta + C$ (E) $-\ln|\cos\theta| + C$

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24. $\int \frac{dx}{\sin^2 2x} =$

(A) $\frac{1}{2}\csc 2x \cot 2x + C$ (B) $-\frac{2}{\sin 2x} + C$ (C) $-\frac{1}{2}\cot 2x + C$

(D) $-\cot x + C$ (E) $-\csc 2x + C$

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25. $\int \cot 2u\, du =$

(A) $\ln|\sin u| + C$ (B) $\frac{1}{2}\ln|\sin 2u| + C$ (C) $-\frac{1}{2}\csc^2 2u + C$

(D) $-\sec 2u + C$ (E) $2\ln|\sin 2u| + C$

26. If $\frac{dy}{dt} = -2y$ and if $y = 1$ when $t = 0$, what is the value of t for which $y = \frac{1}{2}$?

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

27. At each point (x, y) on a certain curve, the slope of the curve is $3x^2y$. If the curve contains the point $(0,8)$, then its equation is

(A) $y = 8e^{x^3}$ (B) $y = x^3 + 8$ (C) $y = e^{x^3} + 7$

(D) $y = \ln(x+1) + 8$ (E) $y^2 = x^3 + 8$

28. If $\frac{dy}{dx} = y\sec^2 x$ and $y = 5$ when $x = 0$, then $y =$

(A) $e^{\tan x} + 4$ (B) $e^{\tan x} + 5$ (C) $5e^{\tan x}$

(D) $\tan x + 5$ (E) $\tan x + 5e^x$

29. Bacteria in a certain culture increase at a rate proportional to the number present. If the number of bacteria doubles in three hours, in how many hours will the number of bacteria triple?

(A) $\frac{3\ln 3}{\ln 2}$ (B) $\frac{2\ln 3}{\ln 2}$ (C) $\frac{\ln 3}{\ln 2}$ (D) $\ln\left(\frac{27}{2}\right)$ (E) $\ln\left(\frac{9}{2}\right)$

30. If $\frac{dy}{dx}=2y^2$ and if $y=-1$ when $x=1$, then when $x=2$, $y=$

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

31. A puppy weighs 2.0 pounds at birth and 3.5 pounds two months later. If the weight of the puppy during its first 6 months is increasing at a rate proportional to its weight, then how much will the puppy weigh when it is 3 months old?

(A) 4.2 pounds (B) 4.6 pounds (C) 4.8 pounds

(D) 5.6 pounds (E) 6.5 pounds

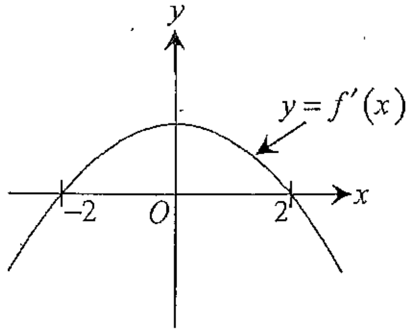
32. If $\frac{dy}{dx} = x^2y$, then y could be

(A) $3\ln\left(\frac{x}{3}\right)$ (B) $e^{\frac{x^3}{3}}+7$ (C) $2e^{\frac{x^3}{3}}$ (D) $3e^{2x}$ (E) $\frac{x^3}{3}+1$

33. During a certain epidemic, the number of people that are infected at any time increases at a rate proportional to the number of people that are infected at that time. If 1,000 people are infected when the epidemic is first discovered, and 1,200 are infected 7 days later, how many people are infected 12 days after the epidemic is first discovered?

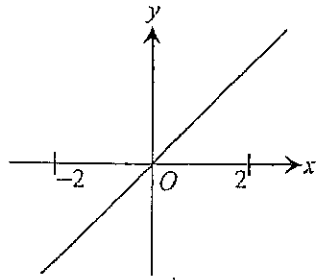
(A) 343 (B) 1,343 (C) 1,367 (D) 1,400 (E) 2,057

34.

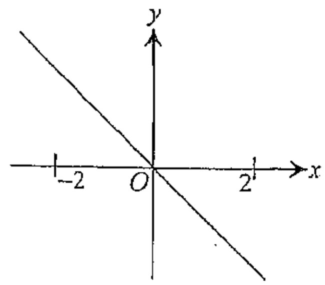


The graph of the derivative of f is shown in the figure above. Which of the following could be the graph of f ?

(A)



(B)



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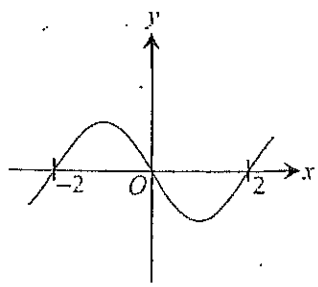

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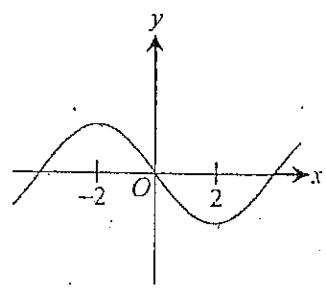
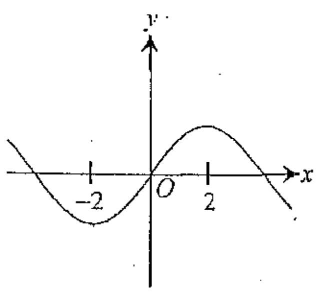


(E)



35.

If $\frac{dy}{dx} = (1 + \ln x)y$ and if $y = 1$ when $x = 1$, then $y =$

(A) $e^{\frac{x^2-1}{x^2}}$ (B) $1 + \ln x$ (C) $\ln x$ (d) $e^{2x + x\ln x - 2}$ (e) $e^{x \ln x}$

(36) If $\frac{dy}{dt} = ky$ and k is a nonzero constant, then y could be

(A) $2e^{kty}$ (B) $2e^{kt}$ (C) $e^{kt}+3$ (D) $kty+5$ (E) $\frac{1}{2}ky^2+\frac{1}{2}$

(37) Population y grows according to the equation $\frac{dy}{dt} = ky$, where k is a constant and t is measured in years. If the population doubles every 10 years, then the value of k is

(A) 0.069 (B) 0.200 (C) 0.301 (D) 3.322 (E) 5.000

(38) If $\frac{d}{dx}(f(x)) = g(x)$ and $\frac{d}{dx}(g(x)) = f(x^2)$, then $\frac{d^2}{dx^2}\left[(f(x^3))\right] =$

(a) $f(x^6)$ (b) $g(x^3)$ (c) $3x^2g(x^3)$ (d) $9x^4f(x^6) + 6xg(x^3)$
(e) $f(x^6) + g(x^3)$.

(39) The fundamental period of the function defined by $f(x) = 3 - 2\cos^2 \frac{\pi x}{3}$ is

(a) 1 (b) 2 (c) 3 (d) 5 (e) 6

$3 - 2\cos\left(\frac{2\pi x}{3}\right)$

(40) $\int \sin(2x + 3)\, dx =$

(a) $\frac{1}{2}\cos(2x+3) + c$ (b) $\cos(2x+3) + c$ (c) $-\cos(2x+3) + c$
(d) $-\frac{1}{2}\cos(2x+3) + c$ (e) $-\frac{1}{5}\cos(2x+3) + c$

(41) What are all values for k for which the graph of $y = x^3 - 3x^2 + k$ will have three distinct x-intercepts?

(a) All $k > 0$ (b) All $k < 4$ (c) $k = 0, 4$ (d) $0 < k < 4$

(42) If $\begin{cases} f(x) = 8 - x^2 & \text{for } -2 \leq x \leq 2, \\ f(x) = x^2 & \text{elsewhere,} \end{cases}$ then $\int_{-1}^{3} f(x)\,dx$ is a number between

(a) 0 and 8 (b) 8 and 16 (c) 16 and 24 (d) 24 and 32
(e) 32 and 40