AP AB Calculus

Derivatives

Multiple Choice

Years: 1969-2008

Hopkins

2008

(A) $6x\left(x^2+2\right)^2$

(B) $6x(x-1)\left(x^2+2\right)^2$

(C) $\left(x^2+2\right)^2\left(x^2+3x-1\right)$

(D) $\left(x^2+2\right)^2\left(7x^2-6x+2\right)$

(E) $-3(x-1)\left(x^2+2\right)^2$

2008

8. If $f(x)=\cos(3x)$, then $f'\left(\frac{\pi}{9}\right)=$

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

2012 FRAPA

2012 AP® CALCULUS AB FREE-RESPONSE QUESTIONS

2012

4. The function f is defined by $f(x)=\sqrt{25-x^2}$ for $-5\le x\le 5$.

(a) Find $f'(x)$.

2008

AP Calculus 2008 Multiple Choice

12. If $f(x)=e^{(2/x)}$, then $f'(x)=$

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

2009

13. If $f(x)=x^2+2x$, then $\frac{d}{dx}\left(f(\ln x)\right)=$

(A) $\frac{2\ln x+2}{x}$ (B) $2x\ln x+2$ (C) $2\ln x+2$ (D) $2\ln x+\frac{2}{x}$ (E) $\frac{2x+2}{x}$

26. What is the slope of the line tangent to the curve $y=\arctan(4x)$ at the point at which $x=\frac{1}{4}$?

2008

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

5. If $3x^2+2xy+y^2=2$, then the value of $\frac{dy}{dx}$ at $x=1$ is

(A) -2 (B) 0 (C) 2 (D) 4 (E) not defined

17. The graph of $y=5x^4-x^5$ has a point of inflection at

(A) (0,0) only (B) (3,162) only (C) (4,256) only

(D) (0,0) and (3,162) (E) (0,0) and (4,256)

18. If $f(x)=2+|x-3|$ for all x, then the value of the derivative $f'(x)$ at $x=3$ is

(A) -1 (B) 0 (C) 1 (D) 2 (E) nonexistent

26. What is the slope of the line tangent to the curve $3y^2-2x^2=6-2xy$ at the point $(3,2)$?

(A) 0 (B) $\frac{4}{9}$ (C) $\frac{7}{9}$ (D) $\frac{6}{7}$ (E) $\frac{5}{3}$

6. If $x^2+xy=10$, then when $x=2$, $\frac{dy}{dx}=$

(A) $-\frac{7}{2}$ (B) -2 (C) $\frac{2}{7}$ (D) $\frac{3}{2}$ (E) $\frac{7}{2}$

16. If $\sin(xy)=x$, then $\frac{dy}{dx}=$

(A) $\frac{1}{\cos(xy)}$

(B) $\frac{1}{x\cos(xy)}$

(C) $\frac{1-\cos(xy)}{\cos(xy)}$

(D) $\frac{1-y\cos(xy)}{x\cos(xy)}$

(E) $\frac{y(1-\cos(xy))}{x}$

9. If $x+2xy-y^2=2$, then at the point $(1,1)$, $\frac{dy}{dx}$ is

1988

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

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13. If $x^2+xy+y^3=0$, then, in terms of x and y, $\frac{dy}{dx}=$

1985

(A) $-\frac{2x+y}{x+3y^2}$ (B) $-\frac{x+3y^2}{2x+y}$ (C) $\frac{-2x}{1+3y^2}$ (D) $\frac{-2x}{x+3y^2}$ (E) $-\frac{2x+y}{x+3y^2-1}$

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4. 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) $-\frac{x^2+y}{x+y^2}$

1993

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

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

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

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9. If $xy^2+2xy=8$, then, at the point $(1,2)$, y' is

(A) $-\frac{5}{2}$ (B) $-\frac{4}{3}$ (C) -1 (D) $-\frac{1}{2}$ (E) 0

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23. $\frac{d}{dx}\left(\int_0^{x^2}\sin\left(t^3\right)dt\right)=$

(A) $-\cos\left(x^6\right)$ (B) $\sin\left(x^3\right)$ (C) $\sin\left(x^6\right)$ (D) $2x\sin\left(x^3\right)$ (E) $2x\sin\left(x^6\right)$

2003

24. 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) $\csc x$

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

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

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

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7. $\frac{d}{dx}\cos^2(x^3) =$

(A) $6x^2 \sin(x^3)\cos(x^3)$

(B) $6x^2 \cos(x^3)$

(C) $\sin^2(x^3)$

(D) $-6x^2 \sin(x^3)\cos(x^3)$

(E) $-2\sin(x^3)\cos(x^3)$

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18. $\frac{d}{dx}(\arcsin 2x) =$

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

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

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9. If $y = \cos^2 3x$, then $\frac{dy}{dx} =$

(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. If $y = \cos^2 x - \sin^2 x$, then $y' =$

1985

(A) -1 (B) 0 (C) $-2\sin(2x)$ (D) $-2(\cos x + \sin x)$ (E) $2(\cos x - \sin x)$

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8. If $y = \tan x - \cot x$, then $\frac{dy}{dx} =$

1993

(A) $\sec x \csc x$ (B) $\sec x - \csc x$ (C) $\sec x + \csc x$ (D) $\sec^2 x - \csc^2 x$ (E) $\sec^2 x + \csc^2 x$

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14. If $y = x^2 \sin 2x$, then $\frac{dy}{dx} =$

2003

(A) $2x \cos 2x$

(B) $4x \cos 2x$

(C) $2x(\sin 2x + \cos 2x)$

(D) $2x(\sin 2x - x \cos 2x)$

(E) $2x(\sin 2x + x \cos 2x)$

16. If $f(x) = \sin\left(e^{-x}\right)$, then $f'(x) =$

1998

(A) $-\cos(e^{-x})$

(B) $\cos(e^{-x}) + e^{-x}$

(C) $\cos(e^{-x}) - e^{-x}$

(D) $e^{-x}\cos(e^{-x})$

(E) $-e^{-x}\cos(e^{-x})$

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17. If $x^2 + y^2 = 25$, what is the value of $\frac{d^2y}{dx^2}$ at the point $(4,3)$?

1997

(A) $-\frac{25}{27}$ (B) $-\frac{7}{27}$ (C) $\frac{7}{27}$ (D) $\frac{3}{4}$ (E) $\frac{25}{27}$

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2. If $f(x)=(2x+1)^4$, then the 4th derivative of $f(x)$ at $x=0$ is

1985

(A) 0 (B) 24 (C) 48 (D) 240 (E) 384

3. If $y=\dfrac{3}{4+x^2}$, then $\dfrac{dy}{dx}=$

1985

(A) $\dfrac{-6x}{(4+x^2)^2}$ (B) $\dfrac{3x}{(4+x^2)^2}$ (C) $\dfrac{6x}{(4+x^2)^2}$ (D) $\dfrac{-3}{(4+x^2)^2}$ (E) $\dfrac{3}{2x}$

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

(A) $(3x^2)^2$ (B) $2(x^3+1)$ (C) $2(3x^2+1)$ (D) $3x^2(x^3+1)$ (E) $6x^2(x^3+1)$

2. If $f(x)=x\sqrt{2x-3}$, then $f'(x)=$

(A) $\dfrac{3x-3}{\sqrt{2x-3}}$

(B) $\dfrac{x}{\sqrt{2x-3}}$

(C) $\dfrac{1}{\sqrt{2x-3}}$

(D) $\dfrac{-x+3}{\sqrt{2x-3}}$

(E) $\dfrac{5x-6}{2\sqrt{2x-3}}$

4. If $y=\dfrac{2x+3}{3x+2}$, then $\dfrac{dy}{dx}=$

(A) $\dfrac{12x+13}{(3x+2)^2}$ (B) $\dfrac{12x-13}{(3x+2)^2}$ (C) $\dfrac{5}{(3x+2)^2}$ (D) $\dfrac{-5}{(3x+2)^2}$ (E) $\dfrac{2}{3}$

39. Let f and g be differentiable functions such that

$f(1)=2$, $f'(1)=3$, $f'(2)=-4$,

$g(1)=2$, $g'(1)=-3$, $g'(2)=5$.

If $h(x)=f(g(x))$, then $h'(1)=$

(C) 0 (D) 12 (E) 15

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

1993

(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) $6x^5$

22. $\frac{d}{dx}\left(\ln e^{2x}\right)=$

969

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

11. $\frac{d}{dx}\ln\left(\frac{1}{1-x}\right)=$

1985 BC

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

31. If $f(x)=\ln(\ln x)$, then $f'(x)=$

1973 BC

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

17. If $f(x)=x\ln\left(x^2\right)$, then $f'(x)=$

1985 BC

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

76. If $f(x)=\frac{e^{2x}}{2x}$, then $f'(x)=$

1997

(A) 1

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

(C) e^{2x}

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

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

2008 CALC.

82. 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

12. If $f(x)=\sin x$, then $f'\left(\frac{\pi}{3}\right)=$

1988

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

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9. If $f(x)=\ln\left(x+4+e^{-3x}\right)$, then $f'(0)$ is

(A) $-\frac{2}{5}$ (B) $\frac{1}{5}$ (C) $\frac{1}{4}$ (D) $\frac{2}{5}$ (E) nonexistent

2003

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23. $\frac{d}{dx}\left(\frac{1}{x^3}-\frac{1}{x}+x^2\right)$ at $x=-1$ is

1984

(A) -6 (B) -4 (C) 0 (D) 2 (E) 6

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4. If $f(x)=-x^3+x+\frac{1}{x}$, then $f'(-1)=$

1997

(A) 3 (B) 1 (C) -1 (D) -3 (E) -5

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28. If $f(x)=\tan(2x)$, then $f'\left(\frac{\pi}{6}\right)=$

998

(A) $\sqrt{3}$ (B) $2\sqrt{3}$ (C) 4 (D) $4\sqrt{3}$ (E) 8

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

1997

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

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10. If $f(x)=(x-1)^2\sin x$, then $f'(0)=$

193

(A) -2 (B) -1 (C) 0 (D) 1 (E) 2