Review 4
AP Calculus AB – 85

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

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

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

(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) $\dfrac{3}{2x}$

5. $\lim\limits_{n\to\infty}\dfrac{4n^2}{n^2+10,000n}$ is

(A) 0 (B) $\dfrac{1}{2,500}$ (C) 1 (D) 4 (E) nonexistent

6. If $f(x)=x$, then $f'(5)=$

(A) 0 (B) $\dfrac{1}{5}$ (C) 1 (D) 5 (E) $\dfrac{25}{2}$

8. The slope of the line tangent to the graph of $y=\ln\left(\dfrac{x}{2}\right)$ at $x=4$ is

(A) $\dfrac{1}{8}$ (B) $\dfrac{1}{4}$ (C) $\dfrac{1}{2}$ (D) 1 (E) 4

10. If $y = 10^{(x^2-1)}$, then $\frac{dy}{dx} =$

(A) $(\ln 10)10^{(x^2-1)}$ (B) $(2x)10^{(x^2-1)}$ (C) $(x^2-1)10^{(x^2-2)}$

(D) $2x(\ln 10)10^{(x^2-1)}$ (E) $x^2(\ln 10)10^{(x^2-1)}$

11. The position of a particle moving along a straight line at any time t is given by $s(t) = t^2 + 4t + 4$. What is the acceleration of the particle when $t = 4$?

(A) 0 (B) 2 (C) 4 (D) 8 (E) 12

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

(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) $-\frac{2x+y}{x+3y^2-1}$

16. The function defined by $f(x) = x^3 - 3x^2$ for all real numbers x has a relative maximum at $x =$

(A) –2 (B) 0 (C) 1 (D) 2 (E) 4

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

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

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

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

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

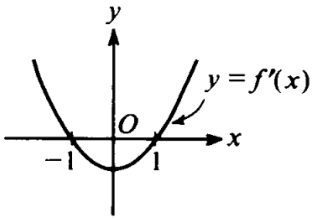
25. If $f(x)=e^x$, which of the following is equal to $f'(e)$?

(A) $\lim_{h\to 0}\frac{e^{x+h}}{h}$ (B) $\lim_{h\to 0}\frac{e^{x+h}-e^e}{h}$ (C) $\lim_{h\to 0}\frac{e^{e+h}-e}{h}$

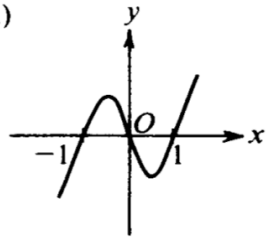
(D) $\lim_{h\to 0}\frac{e^{x+h}-1}{h}$ (E) $\lim_{h\to 0}\frac{e^{e+h}-e^e}{h}$

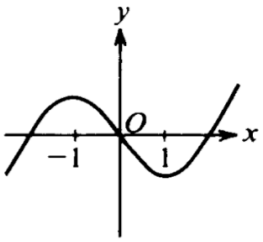
31. The volume of a cone of radius r and height h is given by $V=\frac{1}{3}\pi r^2 h$. If the radius and the height both increase at a constant rate of $\frac{1}{2}$ centimeter per second, at what rate, in cubic centimeters per second, is the volume increasing when the height is 9 centimeters and the radius is 6 centimeters?

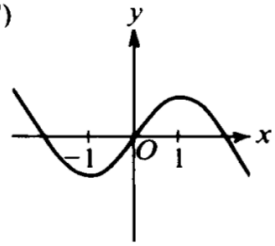
(A) $\frac{1}{2}\pi$ (B) 10π (C) 24π (D) 54π (E) 108π



33. 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)


(C)


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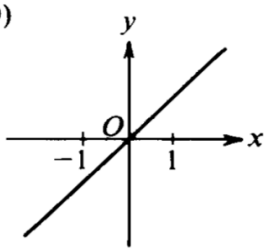
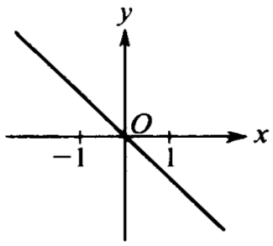


(E)


37. $\lim_{x\to 0}(x\csc x)$ is

(A) $-\infty$ (B) -1 (C) 0 (D) 1 (E) ∞

39. If $f(x)=\dfrac{\ln x}{x}$, for all $x>0$, which of the following is true?

(A) f is increasing for all x greater than 0.
(B) f is increasing for all x greater than 1.
(C) f is decreasing for all x between 0 and 1.
(D) f is decreasing for all x between 1 and e.
(E) f is decreasing for all x greater than e.

43. An equation of the line tangent to $y = x^3 + 3x^2 + 2$ at its point of inflection is

(A) $y = -6x - 6$ (B) $y = -3x + 1$ (C) $y = 2x + 10$

(D) $y = 3x - 1$ (E) $y = 4x + 1$