AP Exam Practice Problems 2.1 – 2.4

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

(A) $\frac{3x-3}{\sqrt{2x-3}}$ (B) $\frac{x}{\sqrt{2x-3}}$ (C) $\frac{1}{\sqrt{2x-3}}$ (D) $\frac{-x+3}{\sqrt{2x-3}}$ (E) $\frac{5x-6}{2\sqrt{2x-3}}$

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

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

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

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

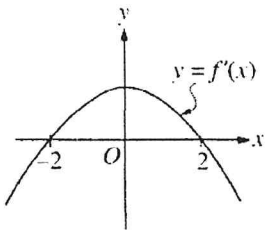
4. An equation of the line tangent to the graph of $y=\cos(2x)$ at $x=\frac{\pi}{4}$ is

(A) $y-1=-\left(x-\frac{\pi}{4}\right)$ (B) $y-1=-2\left(x-\frac{\pi}{4}\right)$ (C) $y=2\left(x-\frac{\pi}{4}\right)$

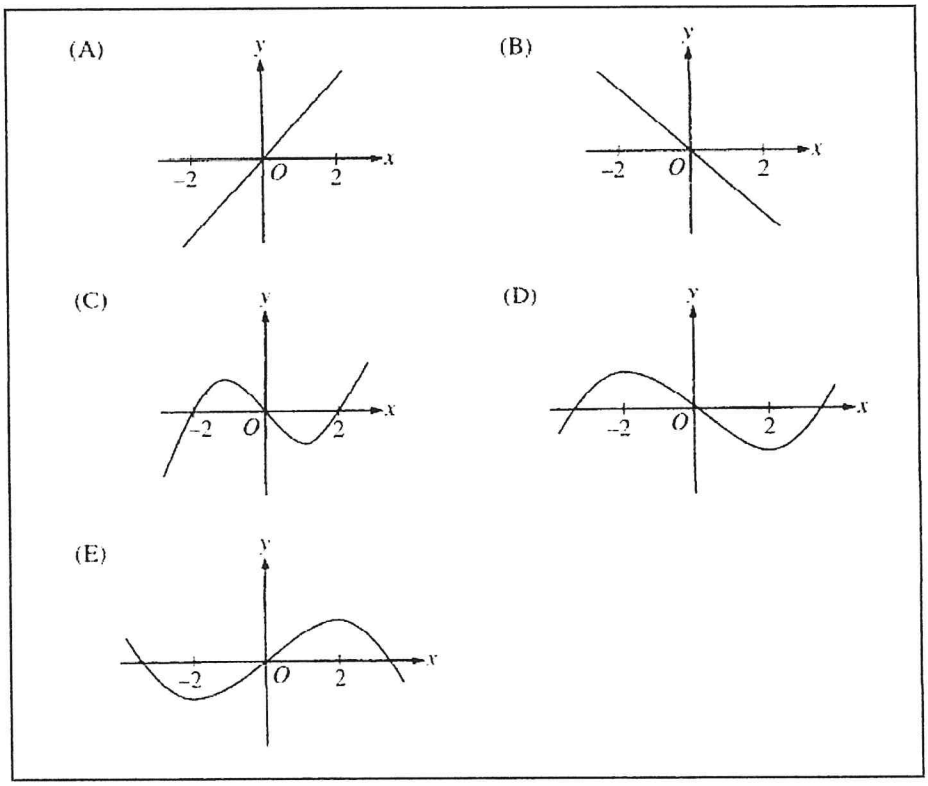
(D) $y=-\left(x-\frac{\pi}{4}\right)$ (E) $y=-2\left(x-\frac{\pi}{4}\right)$

5. At what point on the graph of $y=\frac{1}{2}x^2$ is the tangent line parallel to the line $2x-4y=3$?

(A) $\left(\frac{1}{2},-\frac{1}{2}\right)$ (B) $\left(\frac{1}{2},\frac{1}{8}\right)$ (C) $\left(1,-\frac{1}{4}\right)$ (D) $\left(1,\frac{1}{2}\right)$ (E) $(2,2)$



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



7. If $f(x)=x+\sin x$, then $f'(x)=$

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

8. If $f(x)=\dfrac{x-1}{x+1}$ for all $x\neq -1$, then $f'(1)=$

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

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) $2\sin 3x\cos 3x$

10. 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

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

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

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

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

13. 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) $2(\cos x-\sin x)$

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

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

15. If $f(x)=\frac{x}{\tan x}$, then $f'\left(\frac{\pi}{4}\right)=$

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