SET 2 OF MULTIPLE CHOICE - NO CALCULATOR

1) If $f(x)=x^3+3x^2+4x+5$ and $g(x)=5$, then $g(f(x))=$

(A) $5x^2+15x+25$ (B) $5x^3+15x^2+20x+25$ (C) 1125

(D) 225 (E) 5

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

3) 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

4) Which of the following equations has a graph that is symmetric with respect to the origin?

(A) $y=\dfrac{x+1}{x}$ (B) $y=-x^5+3x$ (C) $y=x^4-2x^2+6$

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

5) If $y=\cos^2 3x$, then $\dfrac{dy}{dx}=$

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

(D) $6\cos 3x$ (E) $2\sin 3x\cos 3x$

6) If the line $3x-4y=0$ is tangent in the first quadrant to the curve $y=x^3+k$, then k is

(A) $\dfrac{1}{2}$ (B) $\dfrac{1}{4}$ (C) 0 (D) $-\dfrac{1}{8}$ (E) $-\dfrac{1}{2}$

7) If $f(x)=2x^3+Ax^2+Bx-5$ and if $f(2)=3$ and $f(-2)=-37$, what is the value of $A+B$?

(A) -6 (B) -3 (C) -1 (D) 2

(E) It cannot be determined from the information given.

8) If $f(x)=x^{\frac{1}{3}}(x-2)^{\frac{2}{3}}$ for all x, then the domain of f' is

(A) $\{x \mid x\neq 0\}$ (B) $\{x \mid x>0\}$ (C) $\{x \mid 0\le x\le 2\}$

(D) $\{x \mid x\neq 0 \text{ and } x\neq 2\}$ (E) $\{x \mid x \text{ is a real number}\}$

9) The radius r of a sphere is increasing at the uniform rate of 0.3 inches per second. At the instant when the surface area S becomes 100π square inches, what is the rate of increase, in cubic inches per second, in the volume V? $\left(S = 4\pi r^2 \text{ and } V = \frac{4}{3}\pi r^3\right)$

(A) 10π (B) 12π (C) 22.5π (D) 25π (E) 30π

10) Suppose that f is an odd function; i.e., $f(-x) = -f(x)$ for all x. Suppose that $f'(x_0)$ exists. Which of the following must necessarily be equal to $f'(-x_0)$?

(A) $f'(x_0)$

(B) $-f'(x_0)$

(C) $\dfrac{1}{f'(x_0)}$

(D) $\dfrac{-1}{f'(x_0)}$

(E) None of the above

11) If $\tan(xy) = x$, then $\dfrac{dy}{dx} =$

(A) $\dfrac{1 - y\tan(xy)\sec(xy)}{x\tan(xy)\sec(xy)}$ (B) $\dfrac{\sec^2(xy) - y}{x}$ (C) $\cos^2(xy)$

(D) $\dfrac{\cos^2(xy)}{x}$ (E) $\dfrac{\cos^2(xy) - y}{x}$

12) If the solutions of $f(x) = 0$ are -1 and 2, then the solutions of $f\left(\frac{x}{2}\right) = 0$ are

(A) -1 and 2 (B) $-\frac{1}{2}$ and $\frac{5}{2}$ (C) $-\frac{3}{2}$ and $\frac{3}{2}$

(D) $-\frac{1}{2}$ and 1 (E) -2 and 4