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IIT JEE - 2021

Home Assignment - 2 | Functions | Mathematics

1. Let $f(x) = 4\cos\sqrt{x^2 - \frac{\pi^2}{9}}$. Then, the range of $f(x)$ is:

(A) $[-1, 1]$ **(B)** $[-4, 4]$ **(C)** $[0, 1]$ **(D)** None of these

2. Let $f(x) = |x-2| + |x-3| + |x-4|$ and $g(x) = f(x+1)$. Then:

(A) $g(x)$ is an even function **(B)** $g(x)$ is an odd function

(C) $g(x)$ is neither even nor odd **(D)** $g(x)$ is periodic

3. The range of the function $f(x) = \frac{5}{3 - x^2}$ is:

(A) $(-\infty, 0) \cup \left[\frac{5}{3}, \infty\right)$ **(B)** $(-\infty, 0) \cup \left(\frac{5}{3}, \infty\right)$

(C) $(-\infty, 0] \cup \left[\frac{5}{3}, \infty\right)$ **(D)** None of these

4. The range of $f(x) = \sqrt{|x| - x}$ is:

(A) $(0, \infty)$ **(B)** $[0, \infty)$ **(C)** $(-\infty, 0)$ **(D)** $(-\infty, 0]$

5. If $f(x) = \log\frac{1+x}{1-x}$ and $g(x) = \frac{3x + x^3}{1 + 3x^2}$ then $(fog)(x)$ is equal to:

(A) $f(x)$ **(B)** $2f(x)$ **(C)** $3f(x)$ **(D)** $4f(x)$

6. If $f(x) = \frac{x-1}{x+1}$, then $f(2x)$ is:

(A) $\frac{f(x)+1}{f(x)+3}$ **(B)** $\frac{3f(x)+1}{f(x)+3}$ **(C)** $\frac{f(x)+3}{f(x)+1}$ **(D)** $\frac{f(x)+3}{3f(x)+1}$

7. Let $f(x) = x$ and $g(x) = |x|$ for all $x \in R$. Then the function $\phi(x)$ satisfying $[\phi(x) - f(x)]^2 + [\phi(x) - g(x)]^2 = 0$ is:

(A) $\phi(x) = x,\ x \in [0, \infty)$ **(B)** $\phi(x) = x,\ x \in R$

(C) $\phi(x) = -x,\ x \in (-\infty, 0]$ **(D)** $\phi(x) = x + |x|,\ x \in R$

8. If $f(x)=\frac{1}{2}\left[3^x+3^{-x}\right]$, $g(x)=\frac{1}{2}\left[3^x-3^{-x}\right]$, then $f(x)\,g(y)+f(y)\,g(x)$ is equal to:

(A) $f(x+y)$ **(B)** $g(x+y)$ **(C)** $2f(x)$ **(D)** $2g(x)$

9. The domain of $f(x)=\frac{1}{|\sin x|+\sin x}$ is:

(A) R **(B)** $\bigcup_{n\in Z}\left((2n+1)\pi,(2n+2)\pi\right)$

(C) $\bigcup_{n\in Z}\left(2n\pi,(2n+1)\pi\right)$ **(D)** ϕ

10. The domain of $\sin\log\left[\frac{\sqrt{4-x^2}}{1-x}\right]$ is:

(A) $(-1,\ 1)$ **(B)** $(-2,\ 1)$ **(C)** $(-2,\ -1)$ **(D)** $(1,\ 2)$