DPP-9 FUNCTIONAL EQUATION

1. If $f: R \to R$ satisfies $f(x+y) = f(x) + f(y)$, for all $x, y \in R$ and $f(1) = 7$, then $\sum_{r=1}^{n} f(r)$ is–

(A) $\frac{7n(n+1)}{2}$ (B) $\frac{7n}{2}$ (C) $\frac{7(n+1)}{2}$ (D) $7n(n+1)$

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2. The value of b and c for which the identity $f(x+1) - f(x) = 8x + 3$ is satisfied, where $f(x) = bx^2 + cx + d$, are

(A) $b = 2, c = 1$ (B) $b = 4, c = -1$ (C) $b = -1, c = 4$ (D) None.

3. Let $f\left(x + \frac{1}{x}\right) = x^2 + \frac{1}{x^2} (x \neq 0)$, then $f(x)$=

(A) x^2 (B) $x^2 - 1$ (C) $x^2 - 2$ (D) None of these.

4. If $f(x + ay, x - ay) = axy$, then $f(x, y)$ equals-

(A) $\frac{x^2 + y^2}{4}$ (B) $\frac{x^2 - y^2}{4}$ (C) x^2 (D) y^2.

5. If $f(x) = \cos(\log x)$, then $\frac{f(xy) + f(x/y)}{f(x)f(y)}$ equals-

(A) 1 (B) –1 (C) 0 (D) 2

6. If $f(x) = |x| + |x-1|$, then for $0 < x < 1$, $f(x)$ equals-

(A) 1 (B) –1 (C) 2x + 1 (D) 2x – 1

7. $f(2x + 3y, 2x - 7y) = 20x$ then $f(x, y)$ equals to –

(A) 7x – 3y (B) 7x + 3y (C) 3x – 7y (D) x – 10y

8. If $f(x) = \log_a x$, then $f(ax)$ equals-

(A) $f(a)f(x)$ (B) $1 + f(x)$ (C) $f(x)$ (D) $a f(x)$

9. If $f(x) = (ax - c)/(cx - a) = y$, then $f(y)$ equals-

(A) x (B) 1/x (C) 1 (D) 0

10. The function f satisfies the functional equation $3f(x) + 2f\left(\frac{x+59}{x-1}\right) = 10x + 30$ for all real $x \neq 1$. The value of $f(7)$ is

(A) 8 (B) 4 (C) –8 (D) 11

11. If $f(x) = \frac{\alpha x}{x+1}, x \neq -1$, for what value of α is $f(f(x)) = x$.

(A) $\sqrt{2}$ (B) $-\sqrt{2}$ (C) –1 (D) 2

12. A real valued function $f(x)$ satisfies the function equation $f(x-y) = f(x)f(y) - f(a-x)f(a+y)$ where a is a given constant and $f(0) = 1$, $f(2a - x)$ is equal to

(A) $f(a) + f(a-x)$ (B) $f(-x)$

(C) $-f(x)$ (D) $f(x)$.

13. The value of b and c for which the identity $f(x+1)-f(x)=8x+3$ is satisfied, where $f(x)=bx^2+cx+d$, are –

(A) $b=2, c=1$ (B) $b=4, c=-1$ (C) $b=-1, c=4$ (D) None

14. If $f(1)=1$ and $f(n+1)=2f(n)+1$ if $n\geq 1$, then $f(n)$ is-

(A) 2^{n+1} (B) 2^n (C) 2^n-1 (D) $2^{n-1}-1$.

15. If $f(x)=\frac{2^x+2^{-x}}{2}$, then $f(x+y).f(x-y)$ is equal to -

(A) $\frac{1}{2}\left[f(x+y)+f(x-y)\right]$ (B) $\frac{1}{2}\left[f(2x)+f(2y)\right]$

(C) $\frac{1}{2}\left[f(x+y).f(x-y)\right]$ (D) None of these

1.	2.	3.	4.	5.
A	B	A	B	D
6.	7.	8.	9.	10.
A	B	B	A	C
11.	12.	13.	14.	15.
C	C	B	C	B