

MATHEMATICS · JEE MAIN

Functions (Advanced)

Chapter-wise previous year questions, with answer key

58

PYQS

2020–2025

PAPERS

4

TOPICS

Composite Functions

Domain and Range

Inverse Functions

Functional Equations

- 1 Attempt each question on paper first — they're grouped by topic, newest papers first.
- 2 Check yourself against the answer key at the end.
- 3 Got one wrong? Tap “Step-by-step solution” under it for the full working.

Stuck on a question?

Every question has a free step-by-step solution on PrepWiser — tap “Step-by-step solution” under it.

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Composite Functions · 1 PYQs

Q1 JEE Main 2022 · 29 Jun · Shift 2

Let $f(x)$ and $g(x)$ be two real polynomials of degree 2 and 1 respectively. If $f(g(x)) = 8x^2 - 2x$ and $g(f(x)) = 4x^2 + 6x + 1$, then the value of $f(2) + g(2)$ is _____.

Numerical answer — enter the value.

[Step-by-step solution ► prepwisar.in/questions/6mGQ-yze1X](https://www.prepwisar.in/questions/6mGQ-yze1X)

Domain and Range · 11 PYQs

Q2 JEE Main 2025 · 7 Apr · Shift 2

If the range of the function $f(x) = \frac{5-x}{x^2-3x+2}$, $x \neq 1, 2$, is $(-\infty, \alpha] \cup [\beta, \infty)$, then $\alpha^2 + \beta^2$ is equal to :

(A) 188

(B) 192

(C) 190

(D) 194

[Step-by-step solution ► prepwisar.in/questions/5q109jOf-K](https://www.prepwisar.in/questions/5q109jOf-K)

Q3 JEE Main 2025 · 2 Apr · Shift 2

If the domain of the function $f(x) = \frac{1}{\sqrt{10+3x-x^2}} + \frac{1}{\sqrt{x+|x|}}$ is (a, b) , then $(1+a)^2 + b^2$ is equal to :

(A) 29

(B) 30

(C) 25

(D) 26

[Step-by-step solution ► prepwisar.in/questions/mwCobcX_Cp](https://www.prepwisar.in/questions/mwCobcX_Cp)

Q4 JEE Main 2025 · 28 Jan · Shift 2

Let $f : [0, 3] \rightarrow A$ be defined by $f(x) = 2x^3 - 15x^2 + 36x + 7$ and $g : [0, \infty) \rightarrow B$ be defined by $g(x) = \frac{x^{2025}}{x^{2025} + 1}$. If both the functions are onto and $S = \{x \in \mathbb{Z}; x \in A \text{ or } x \in B\}$, then $n(S)$ is equal to :

(A) 29

(B) 31

(C) 30

(D) 36

[Step-by-step solution ► prepwisar.in/questions/KkBJYu_Syq](https://www.prepwisar.in/questions/KkBJYu_Syq)

Q5 JEE Main 2024 · 6 Apr · Shift 2

Let $f(x) = \frac{1}{7 - \sin 5x}$ be a function defined on $\mathbb{R}$. Then the range of the function $f(x)$ is equal to :

(A) $\left[\frac{1}{8}, \frac{1}{5}\right]$

(B) $\left[\frac{1}{7}, \frac{1}{6}\right]$

(C) $\left[\frac{1}{7}, \frac{1}{5}\right]$

(D) $\left[\frac{1}{8}, \frac{1}{6}\right]$

[Step-by-step solution ► prepwisar.in/questions/gBxaocoxwt](https://www.prepwisar.in/questions/gBxaocoxwt)

Q6 JEE Main 2024 · 1 Feb · Shift 2

If the domain of the function

$f(x) = \frac{\sqrt{x^2-25}}{(4-x^2)} + \log_{10}(x^2 + 2x - 15)$ is $(-\infty, \alpha) \cup [\beta, \infty)$, then $\alpha^2 + \beta^3$ is equal to :

- (A) 140 (B) 175
(C) 125 (D) 150

[Step-by-step solution ► prepwiser.in/questions/BlItBmHoqo-](https://www.prepwiser.in/questions/BlItBmHoqo-)

Q7 JEE Main 2023 · 15 Apr · Shift 1

If the domain of the function

$f(x) = \log_e(4x^2 + 11x + 6) + \sin^{-1}(4x + 3) + \cos^{-1}\left(\frac{10x+6}{3}\right)$ is $(\alpha, \beta]$, then

$36|\alpha + \beta|$ is equal to :

- (A) 72 (B) 54
(C) 45 (D) 63

[Step-by-step solution ► prepwiser.in/questions/6w6V5aX9jR](https://www.prepwiser.in/questions/6w6V5aX9jR)

Q8 JEE Main 2023 · 31 Jan · Shift 2

Let $f : \mathbb{R} - \{2, 6\} \rightarrow \mathbb{R}$ be real valued function

defined as $f(x) = \frac{x^2+2x+1}{x^2-8x+12}$.

Then range of f is

- (A) $(-\infty, -\frac{21}{4}] \cup [1, \infty)$
(B) $(-\infty, -\frac{21}{4}) \cup (0, \infty)$
(C) $(-\infty, -\frac{21}{4}] \cup [0, \infty)$
(D) $(-\infty, -\frac{21}{4}] \cup [\frac{21}{4}, \infty)$

[Step-by-step solution ► prepwiser.in/questions/wget0GLEjm](https://www.prepwiser.in/questions/wget0GLEjm)

Q9 JEE Main 2023 · 30 Jan · Shift 2

The range of the function $f(x) = \sqrt{3-x} + \sqrt{2+x}$ is :

- (A) $[2\sqrt{2}, \sqrt{11}]$ (B) $[\sqrt{5}, \sqrt{13}]$
(C) $[\sqrt{2}, \sqrt{7}]$ (D) $[\sqrt{5}, \sqrt{10}]$

[Step-by-step solution ► prepwiser.in/questions/vxmqcMDIf](https://www.prepwiser.in/questions/vxmqcMDIf)

Q10 JEE Main 2023 · 29 Jan · Shift 1

The domain of

$$f(x) = \frac{\log_{(x+1)}(x-2)}{e^{2\log_e x} - (2x+3)}, x \in \mathbb{R}$$

is

(A) $(-1, \infty) - \{3\}$

(B) $\mathbb{R} - \{-1, 3\}$

(C) $(2, \infty) - \{3\}$

(D) $\mathbb{R} - \{3\}$

[Step-by-step solution ► prepwisser.in/questions/TuWpzXgKwz](https://www.prepwisser.in/questions/TuWpzXgKwz)

Q11 JEE Main 2023 · 25 Jan · Shift 2

Let $f : \mathbb{R} \rightarrow \mathbb{R}$ be a function defined by $f(x) = \log_{\sqrt{m}}\{\sqrt{2}(\sin x - \cos x) + m - 2\}$, for some m , such that the range of f is $[0, 2]$. Then the value of m is _____

(A) 4

(B) 3

(C) 5

(D) 2

[Step-by-step solution ► prepwisser.in/questions/qMnYo3SiPz](https://www.prepwisser.in/questions/qMnYo3SiPz)

Q12 JEE Main 2021 · 18 Mar · Shift 1

If the functions are defined as $f(x) = \sqrt{x}$ and $g(x) = \sqrt{1-x}$, then what is the common domain of the following functions :

$f+g, f-g, f/g, g/f, g-f$ where $(f \pm g)(x) = f(x) \pm g(x), (f/g)x = \frac{f(x)}{g(x)}$

(A) $0 \leq x \leq 1$

(B) $0 \leq x < 1$

(C) $0 < x < 1$

(D) $0 < x \leq 1$

[Step-by-step solution ► prepwisser.in/questions/9-iywGN156](https://www.prepwisser.in/questions/9-iywGN156)

Inverse Functions · 7 PYQs

Q13 JEE Main 2024 · 5 Apr · Shift 1

Let $f(x) = x^5 + 2x^3 + 3x + 1, x \in \mathbf{R}$, and $g(x)$ be a function such that $g(f(x)) = x$ for all $x \in \mathbf{R}$. Then $\frac{g(7)}{g'(7)}$ is equal to :

(A) 42

(B) 7

(C) 1

(D) 14

[Step-by-step solution ► prepwisser.in/questions/aDqBFFYEyu](https://www.prepwisser.in/questions/aDqBFFYEyu)

Q14 JEE Main 2024 · 4 Apr · Shift 1

Let $f(x) = x^5 + 2e^{x/4}$ for all $x \in \mathbf{R}$. Consider a function $g(x)$ such that $(g \circ f)(x) = x$ for all $x \in \mathbf{R}$. Then the value of $8g'(2)$ is :

(A) 4

(B) 2

(C) 16

(D) 8

[Step-by-step solution ► prepwisser.in/questions/VBuKSEvePk](https://www.prepwisser.in/questions/VBuKSEvePk)

Q15 JEE Main 2022 · 28 Jul · Shift 1

Let α, β and γ be three positive real numbers. Let $f(x) = \alpha x^5 + \beta x^3 + \gamma x, x \in \mathbf{R}$ and $g : \mathbf{R} \rightarrow \mathbf{R}$ be such that $g(f(x)) = x$ for all $x \in \mathbf{R}$. If $a_1, a_2, a_3, \dots, a_n$ be in arithmetic progression with mean zero, then the value of

$$f\left(g\left(\frac{1}{n}\sum_{i=1}^n f(a_i)\right)\right)$$

is equal to :

- (A) 0 (B) 3
(C) 9 (D) 27

[Step-by-step solution ► prepwisser.in/questions/zVw8OCR7SC](https://www.prepwisser.in/questions/zVw8OCR7SC)

Q16 JEE Main 2022 · 25 Jun · Shift 1

Let $f : \mathbf{R} \rightarrow \mathbf{R}$ be defined as $f(x) = x^3 + x - 5$. If $g(x)$ is a function such that $f(g(x)) = x, \forall x' \in \mathbf{R}$, then $g'(63)$ is equal to _____.

- (A) $\frac{1}{49}$ (B) $\frac{3}{49}$
(C) $\frac{43}{49}$ (D) $\frac{91}{49}$

[Step-by-step solution ► prepwisser.in/questions/nV6AF_ujcg](https://www.prepwisser.in/questions/nV6AF_ujcg)

Q17 JEE Main 2021 · 18 Mar · Shift 2

Let $f : \mathbf{R} - \{3\} \rightarrow \mathbf{R} - \{1\}$ be defined by $f(x) = \frac{x-2}{x-3}$.

Let $g : \mathbf{R} \rightarrow \mathbf{R}$ be given as $g(x) = 2x - 3$. Then, the sum of all the values of x for which $f^{-1}(x) + g^{-1}(x) = \frac{13}{2}$ is equal to :

- (A) 3 (B) 5
(C) 2 (D) 7

[Step-by-step solution ► prepwisser.in/questions/H97AOaZdp0](https://www.prepwisser.in/questions/H97AOaZdp0)

Q18 JEE Main 2021 · 17 Mar · Shift 1

The inverse of $y = 5^{\log x}$ is :

- (A) $x = 5^{\log y}$ (B) $x = y^{\frac{1}{\log 5}}$
(C) $x = 5^{\frac{1}{\log y}}$ (D) $x = y^{\log 5}$

[Step-by-step solution ► prepwisser.in/questions/64I7Nt-gPw](https://www.prepwisser.in/questions/64I7Nt-gPw)

Q19 JEE Main 2020 · 8 Jan · Shift 1

The inverse function of

$f(x) = \frac{8^{2x} - 8^{-2x}}{8^{2x} + 8^{-2x}}, x \in (-1, 1)$, is :

- (A) $\frac{1}{4} \log_e \left(\frac{1-x}{1+x} \right)$
- (B) $\frac{1}{4} (\log_8 e) \log_e \left(\frac{1-x}{1+x} \right)$
- (C) $\frac{1}{4} (\log_8 e) \log_e \left(\frac{1+x}{1-x} \right)$
- (D) $\frac{1}{4} \log_e \left(\frac{1+x}{1-x} \right)$

[Step-by-step solution ► prepwiser.in/questions/L4xIhBJpXy](https://www.prepwiser.in/questions/L4xIhBJpXy)

Functional Equations · 39 PYQs

Q20 JEE Main 2025 · 4 Apr · Shift 1

Let $f : \mathbb{R} \rightarrow \mathbb{R}$ be a continuous function satisfying $f(0) = 1$ and $f(2x) - f(x) = x$ for all $x \in \mathbb{R}$. If

$\lim_{n \rightarrow \infty} \left\{ f(x) - f\left(\frac{x}{2^n}\right) \right\} = G(x)$, then $\sum_{r=1}^{10} G(r^2)$ is equal to

- (A) 215 (B) 420
- (C) 385 (D) 540

[Step-by-step solution ► prepwiser.in/questions/iTVNIXybfa](https://www.prepwiser.in/questions/iTVNIXybfa)

Q21 JEE Main 2025 · 3 Apr · Shift 2

Let f be a function such that $f(x) + 3f\left(\frac{24}{x}\right) = 4x, x \neq 0$. Then $f(3) + f(8)$ is equal to

- (A) 13 (B) 11
- (C) 10 (D) 12

[Step-by-step solution ► prepwiser.in/questions/SduSQEsbco](https://www.prepwiser.in/questions/SduSQEsbco)

Q22 JEE Main 2025 · 2 Apr · Shift 1

Let $f : \mathbf{R} \rightarrow \mathbf{R}$ be a twice differentiable function such that $(\sin x \cos y)(f(2x + 2y) - f(2x - 2y)) = (\cos x \sin y)(f(2x + 2y) + f(2x - 2y))$, for all $x, y \in \mathbf{R}$. If $f'(0) = \frac{1}{2}$, then the value of $24f''\left(\frac{5\pi}{3}\right)$ is :

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

[Step-by-step solution ► prepwiser.in/questions/wAPCD_qcBY](https://www.prepwiser.in/questions/wAPCD_qcBY)

Q23 JEE Main 2025 · 28 Jan · Shift 1

If $f(x) = \frac{2^x}{2^x + \sqrt{2}}, x \in \mathbb{R}$, then $\sum_{k=1}^{81} f\left(\frac{k}{82}\right)$ is equal to

- (A) 82 (B) $81\sqrt{2}$
- (C) 41 (D) $\frac{81}{2}$

[Step-by-step solution ► prepwiser.in/questions/n7-OzVwN8k](https://www.prepwiser.in/questions/n7-OzVwN8k)

Q24 JEE Main 2025 · 28 Jan · Shift 1

Let $f : \mathbb{R} \rightarrow \mathbb{R}$ be a function defined by $f(x) = (2 + 3a)x^2 + \left(\frac{a+2}{a-1}\right)x + b$, $a \neq 1$. If $f(x+y) = f(x) + f(y) + 1 - \frac{2}{7}xy$, then the value of $28 \sum_{i=1}^5 |f(i)|$ is

- (A) 735 (B) 675
(C) 715 (D) 545

Step-by-step solution ► [prepwisar.in/questions/CyRzrYpj7u](https://www.prepwisar.in/questions/CyRzrYpj7u)

Q25 JEE Main 2025 · 28 Jan · Shift 2

Let $f : \mathbb{R} - \{0\} \rightarrow (-\infty, 1)$ be a polynomial of degree 2, satisfying $f(x)f\left(\frac{1}{x}\right) = f(x) + f\left(\frac{1}{x}\right)$. If $f(K) = -2K$, then the sum of squares of all possible values of K is :

- (A) 9
(B) 1
(C) 6
(D) 7

Step-by-step solution ► [prepwisar.in/questions/qsbRk1S602](https://www.prepwisar.in/questions/qsbRk1S602)

Q26 JEE Main 2025 · 24 Jan · Shift 1

Let $f : \mathbb{R} - \{0\} \rightarrow \mathbb{R}$ be a function such that $f(x) - 6f\left(\frac{1}{x}\right) = \frac{35}{3x} - \frac{5}{2}$. If the $\lim_{x \rightarrow 0} \left(\frac{1}{\alpha x} + f(x)\right) = \beta$; $\alpha, \beta \in \mathbb{R}$, then $\alpha + 2\beta$ is equal to

- (A) 6 (B) 5
(C) 3 (D) 4

Step-by-step solution ► [prepwisar.in/questions/HuO757hUdd](https://www.prepwisar.in/questions/HuO757hUdd)

Q27 JEE Main 2025 · 22 Jan · Shift 1

Let $f(x)$ be a real differentiable function such that $f(0) = 1$ and $f(x+y) = f(x)f'(y) + f'(x)f(y)$ for all $x, y \in \mathbb{R}$. Then $\sum_{n=1}^{100} \log_e f(n)$ is equal to :

- (A) 2406 (B) 5220
(C) 2525 (D) 2384

Step-by-step solution ► [prepwisar.in/questions/AdUUVj4S1K](https://www.prepwisar.in/questions/AdUUVj4S1K)

Q28 JEE Main 2024 · 9 Apr · Shift 1

If a function f satisfies $f(m+n) = f(m) + f(n)$ for all $m, n \in \mathbb{N}$ and $f(1) = 1$, then the largest natural number λ such that $\sum_{k=1}^{2022} f(\lambda + k) \leq (2022)^2$ is equal to _____.

Numerical answer — enter the value.

Step-by-step solution ► [prepwisar.in/questions/8_kbHlBD-M](https://www.prepwisar.in/questions/8_kbHlBD-M)

Q29 JEE Main 2024 · 30 Jan · Shift 2

Let $f : \mathbb{R} - \{0\} \rightarrow \mathbb{R}$ be a function satisfying $f\left(\frac{x}{y}\right) = \frac{f(x)}{f(y)}$ for all x, y , $f(y) \neq 0$. If $f'(1) = 2024$, then

- (A) $xf'(x) + 2024f(x) = 0$ (B) $xf'(x) - 2023f(x) = 0$
(C) $xf'(x) - 2024f(x) = 0$ (D) $xf'(x) + f(x) = 2024$

Step-by-step solution ► [prepwisar.in/questions/BCqYHNRYBP](https://www.prepwisar.in/questions/BCqYHNRYBP)

Q30 JEE Main 2023 · 13 Apr · Shift 1

For the differentiable function $f : \mathbb{R} - \{0\} \rightarrow \mathbb{R}$, let $3f(x) + 2f\left(\frac{1}{x}\right) = \frac{1}{x} - 10$, then $|f(3) + f'\left(\frac{1}{4}\right)|$ is equal to

- (A) 13 (B) $\frac{29}{5}$
(C) $\frac{33}{5}$ (D) 7

[Step-by-step solution](https://www.prepwiser.in/questions/a75uwLwACW) ▶ [prepwiser.in/questions/a75uwLwACW](https://www.prepwiser.in/questions/a75uwLwACW)

Q31 JEE Main 2023 · 10 Apr · Shift 1

If

$$f(x) = \frac{(\tan 1^\circ)x + \log_e(123)}{x \log_e(1234) - (\tan 1^\circ)}, x > 0$$

, then the least value of $f(f(x)) + f\left(f\left(\frac{4}{x}\right)\right)$ is :

- (A) 2 (B) 4
(C) 0 (D) 8

[Step-by-step solution](https://www.prepwiser.in/questions/cVcTudWQ_S) ▶ [prepwiser.in/questions/cVcTudWQ_S](https://www.prepwiser.in/questions/cVcTudWQ_S)

Q32 JEE Main 2023 · 6 Apr · Shift 1

Let $5f(x) + 4f\left(\frac{1}{x}\right) = \frac{1}{x} + 3, x > 0$. Then $18 \int_1^2 f(x)dx$ is equal to :

- (A) $10 \log_e 2 + 6$ (B) $5 \log_e 2 - 3$
(C) $10 \log_e 2 - 6$ (D) $5 \log_e 2 + 3$

[Step-by-step solution](https://www.prepwiser.in/questions/HpKYQULh9W) ▶ [prepwiser.in/questions/HpKYQULh9W](https://www.prepwiser.in/questions/HpKYQULh9W)

Q33 JEE Main 2023 · 1 Feb · Shift 2

Let $f : \mathbb{R} - 0, 1 \rightarrow \mathbb{R}$ be a function such that $f(x) + f\left(\frac{1}{1-x}\right) = 1 + x$. Then $f(2)$ is equal to

- (A) $\frac{9}{4}$ (B) $\frac{7}{4}$
(C) $\frac{7}{3}$ (D) $\frac{9}{2}$

[Step-by-step solution](https://www.prepwiser.in/questions/uscjIBW8g-) ▶ [prepwiser.in/questions/uscjIBW8g-](https://www.prepwiser.in/questions/uscjIBW8g-)

Q34 JEE Main 2023 · 30 Jan · Shift 2

Let $A = \{1, 2, 3, 5, 8, 9\}$. Then the number of possible functions $f : A \rightarrow A$ such that $f(m \cdot n) = f(m) \cdot f(n)$ for every $m, n \in A$ with $m \cdot n \in A$ is equal to _____.

Numerical answer — enter the value.

[Step-by-step solution](https://www.prepwiser.in/questions/zvpMcf1GwF) ▶ [prepwiser.in/questions/zvpMcf1GwF](https://www.prepwiser.in/questions/zvpMcf1GwF)

Q35 JEE Main 2023 · 30 Jan · Shift 1

Suppose $f : \mathbb{R} \rightarrow (0, \infty)$ be a differentiable function such that $5f(x+y) = f(x) \cdot f(y), \forall x, y \in \mathbb{R}$. If $f(3) = 320$, then $\sum_{n=0}^5 f(n)$ is equal to :

- (A) 6875 (B) 6525
(C) 6575 (D) 6825

[Step-by-step solution](https://www.prepwiser.in/questions/1iZEzv2L1J) ▶ [prepwiser.in/questions/1iZEzv2L1J](https://www.prepwiser.in/questions/1iZEzv2L1J)

Q36 JEE Main 2023 · 29 Jan · Shift 1

Let $f : \mathbb{R} \rightarrow \mathbb{R}$ be a differentiable function that satisfies the relation $f(x + y) = f(x) + f(y) - 1, \forall x, y \in \mathbb{R}$. If $f'(0) = 2$, then $|f(-2)|$ is equal to _____.

Numerical answer — enter the value.

[Step-by-step solution ► prepwisar.in/questions/Y7ace1Fds4](https://www.prepwisar.in/questions/Y7ace1Fds4)

Q37 JEE Main 2023 · 29 Jan · Shift 2

Consider a function $f : \mathbb{N} \rightarrow \mathbb{R}$, satisfying $f(1) + 2f(2) + 3f(3) + \dots + xf(x) = x(x+1)f(x); x \geq 2$ with $f(1) = 1$. Then $\frac{1}{f(2022)} + \frac{1}{f(2028)}$ is equal to

(A) 8000

(B) 8400

(C) 8100

(D) 8200

[Step-by-step solution ► prepwisar.in/questions/tmbGPKTBc9](https://www.prepwisar.in/questions/tmbGPKTBc9)

Q38 JEE Main 2023 · 29 Jan · Shift 1

Suppose f is a function satisfying $f(x + y) = f(x) + f(y)$ for all $x, y \in \mathbb{N}$ and $f(1) = \frac{1}{5}$. If

$\sum_{n=1}^m \frac{f(n)}{n(n+1)(n+2)} = \frac{1}{12}$, then m is equal to _____.

Numerical answer — enter the value.

[Step-by-step solution ► prepwisar.in/questions/YRJ8plfOV1](https://www.prepwisar.in/questions/YRJ8plfOV1)

Q39 JEE Main 2023 · 25 Jan · Shift 2

The number of functions

$f : \{1, 2, 3, 4\} \rightarrow \{a \in \mathbb{Z} | a| \leq 8\}$

satisfying $f(n) + \frac{1}{n}f(n+1) = 1, \forall n \in \{1, 2, 3\}$ is

(A) 2

(B) 3

(C) 1

(D) 4

[Step-by-step solution ► prepwisar.in/questions/ihIeZCTVD_](https://www.prepwisar.in/questions/ihIeZCTVD_)

Q40 JEE Main 2023 · 24 Jan · Shift 2

Let $f(x)$ be a function such that $f(x + y) = f(x) \cdot f(y)$ for all $x, y \in \mathbb{N}$. If $f(1) = 3$ and $\sum_{k=1}^n f(k) = 3279$, then the value of n is

(A) 9

(B) 7

(C) 6

(D) 8

[Step-by-step solution ► prepwisar.in/questions/PDJ9_LCD_x](https://www.prepwisar.in/questions/PDJ9_LCD_x)

Q41 JEE Main 2023 · 24 Jan · Shift 2

If $f(x) = \frac{2^{2x}}{2^{2x}+2}, x \in \mathbb{R}$, then

$$f\left(\frac{1}{2023}\right) + f\left(\frac{2}{2023}\right) + \dots + f\left(\frac{2022}{2023}\right)$$

is equal to

(A) 2011

(B) 2010

(C) 1010

(D) 1011

[Step-by-step solution ► prepwisar.in/questions/RcDS61ffZB](https://www.prepwisar.in/questions/RcDS61ffZB)

Q42 JEE Main 2022 · 27 Jul · Shift 2

Let f be a differentiable function satisfying

$$f(x) = \frac{2}{\sqrt{3}} \int_0^{\sqrt{3}} f\left(\frac{\lambda^2 x}{3}\right) d\lambda, x > 0$$

and $f(1) = \sqrt{3}$. If $y = f(x)$ passes through the point $(\alpha, 6)$, then α is equal to _____.

Numerical answer — enter the value.

[Step-by-step solution ► prepwiser.in/questions/8Amj29NhBv](https://www.prepwiser.in/questions/8Amj29NhBv)

Q43 JEE Main 2022 · 26 Jul · Shift 1

Let $f : \mathbb{R} \rightarrow \mathbb{R}$ be a continuous function such that $f(3x) - f(x) = x$. If $f(8) = 7$, then $f(14)$ is equal to :

- (A) 4 (B) 10
(C) 11 (D) 16

[Step-by-step solution ► prepwiser.in/questions/mS_L0Piw7s](https://www.prepwiser.in/questions/mS_L0Piw7s)

Q44 JEE Main 2022 · 29 Jun · Shift 1

Let $c, k \in \mathbb{R}$. If $f(x) = (c+1)x^2 + (1-c^2)x + 2k$ and $f(x+y) = f(x) + f(y) - xy$, for all $x, y \in \mathbb{R}$, then the value of $|2(f(1) + f(2) + f(3) + \dots + f(20))|$ is equal to _____.

Numerical answer — enter the value.

[Step-by-step solution ► prepwiser.in/questions/TrsLNnIOdY](https://www.prepwiser.in/questions/TrsLNnIOdY)

Q45 JEE Main 2022 · 27 Jun · Shift 1

Let $f : \mathbb{R} \rightarrow \mathbb{R}$ be a function defined by $f(x) = \frac{2e^{2x}}{e^{2x}+e}$. Then

$$f\left(\frac{1}{100}\right) + f\left(\frac{2}{100}\right) + f\left(\frac{3}{100}\right) + \dots + f\left(\frac{99}{100}\right)$$

is equal to _____.

Numerical answer — enter the value.

[Step-by-step solution ► prepwiser.in/questions/8K5maySycj](https://www.prepwiser.in/questions/8K5maySycj)

Q46 JEE Main 2022 · 26 Jun · Shift 2

Let $f : \mathbb{R} \rightarrow \mathbb{R}$ satisfy $f(x+y) = 2^x f(y) + 4^y f(x)$, $\forall x, y \in \mathbb{R}$. If $f(2) = 3$, then $14 \cdot \frac{f'(4)}{f'(2)}$ is equal to _____.

Numerical answer — enter the value.

[Step-by-step solution ► prepwiser.in/questions/0SCfrIxYOs](https://www.prepwiser.in/questions/0SCfrIxYOs)

Q47 JEE Main 2022 · 25 Jun · Shift 1

Let $f : \mathbb{N} \rightarrow \mathbb{R}$ be a function such that $f(x+y) = 2f(x)f(y)$ for natural numbers x and y . If $f(1) = 2$, then the value of α for which

$$\sum_{k=1}^{10} f(\alpha + k) = \frac{512}{3}(2^{20} - 1)$$

holds, is :

- (A) 2 (B) 3
(C) 4 (D) 6

[Step-by-step solution ► prepwiser.in/questions/fnSwS9jOIH](https://www.prepwiser.in/questions/fnSwS9jOIH)

Q48 JEE Main 2021 · 31 Aug · Shift 2

Let $f: \mathbb{N} \rightarrow \mathbb{N}$ be a function such that $f(m+n) = f(m) + f(n)$ for every $m, n \in \mathbb{N}$. If $f(6) = 18$, then $f(2) \cdot f(3)$ is equal to :

- (A) 6 (B) 54
(C) 18 (D) 36

[Step-by-step solution ► prepwisser.in/questions/JyCj2oOQuj](https://www.prepwisser.in/questions/JyCj2oOQuj)

Q49 JEE Main 2021 · 27 Jul · Shift 2

Let $f: \mathbb{R} \rightarrow \mathbb{R}$ be defined as $f(x+y) + f(x-y) = 2f(x)f(y)$, $f\left(\frac{1}{2}\right) = -1$. Then, the value of

$\sum_{k=1}^{20} \frac{1}{\sin(k) \sin(k+f(k))}$ is equal to :

- (A) $\operatorname{cosec}^2(21) \cos(20) \cos(2)$
(B) $\sec^2(1) \sec(21) \cos(20)$
(C) $\operatorname{cosec}^2(1) \operatorname{cosec}(21) \sin(20)$
(D) $\sec^2(21) \sin(20) \sin(2)$

[Step-by-step solution ► prepwisser.in/questions/LxTxKL6Ihn](https://www.prepwisser.in/questions/LxTxKL6Ihn)

Q50 JEE Main 2021 · 27 Jul · Shift 1

Let $S = \{1, 2, 3, 4, 5, 6, 7\}$. Then the number of possible functions $f: S \rightarrow S$ such that $f(m \cdot n) = f(m) \cdot f(n)$ for every $m, n \in S$ and $m \cdot n \in S$ is equal to _____.

Numerical answer — enter the value.

[Step-by-step solution ► prepwisser.in/questions/b_uNG3BLUR](https://www.prepwisser.in/questions/b_uNG3BLUR)

Q51 JEE Main 2021 · 18 Mar · Shift 2

Let $f: \mathbb{R} \rightarrow \mathbb{R}$ satisfy the equation $f(x+y) = f(x) \cdot f(y)$ for all $x, y \in \mathbb{R}$ and $f(x) \neq 0$ for any $x \in \mathbb{R}$. If the function f is differentiable at $x = 0$ and $f'(0) = 3$, then

$\lim_{h \rightarrow 0} \frac{1}{h} (f(h) - 1)$ is equal to _____.

Numerical answer — enter the value.

[Step-by-step solution ► prepwisser.in/questions/ebVgUpuwb9](https://www.prepwisser.in/questions/ebVgUpuwb9)

Q52 JEE Main 2021 · 25 Feb · Shift 2

A function $f(x)$ is given by $f(x) = \frac{5^x}{5^x + 5}$, then the sum of the series

$$f\left(\frac{1}{20}\right) + f\left(\frac{2}{20}\right) + f\left(\frac{3}{20}\right) + \dots + f\left(\frac{39}{20}\right)$$

is equal to :

- (A) $\frac{39}{2}$ (B) $\frac{19}{2}$
(C) $\frac{49}{2}$ (D) $\frac{29}{2}$

[Step-by-step solution ► prepwisser.in/questions/Kcvxdq079A](https://www.prepwisser.in/questions/Kcvxdq079A)

Q53 JEE Main 2021 · 24 Feb · Shift 2

If $a + \alpha = 1$, $b + \beta = 2$ and $af(x) + \alpha f\left(\frac{1}{x}\right) = bx + \frac{\beta}{x}$, $x \neq 0$, then the value of the expression $\frac{f(x) + f\left(\frac{1}{x}\right)}{x + \frac{1}{x}}$ is _____.

Numerical answer — enter the value.

[Step-by-step solution ► prepwisar.in/questions/HiQhC_V7OP](https://www.prepwisar.in/questions/HiQhC_V7OP)

Q54 JEE Main 2020 · 6 Sep · Shift 2

For a suitably chosen real constant a , let a

function, $f : R - \{-a\} \rightarrow R$ be defined by

$f(x) = \frac{a-x}{a+x}$. Further suppose that for any real number $x \neq -a$ and $f(x) \neq -a$,

$(f \circ f)(x) = x$. Then $f\left(-\frac{1}{2}\right)$ is equal to :

- (A) $\frac{1}{3}$ (B) -3
(C) $-\frac{1}{3}$ (D) 3

[Step-by-step solution ► prepwisar.in/questions/FW7W9ffYv2](https://www.prepwisar.in/questions/FW7W9ffYv2)

Q55 JEE Main 2020 · 6 Sep · Shift 2

Suppose that a function $f : R \rightarrow R$ satisfies

$f(x+y) = f(x)f(y)$ for all $x, y \in R$ and $f(1) = 3$.

If $\sum_{i=1}^n f(i) = 363$ then n is equal to _____.

Numerical answer — enter the value.

[Step-by-step solution ► prepwisar.in/questions/UR8RNUCUJW](https://www.prepwisar.in/questions/UR8RNUCUJW)

Q56 JEE Main 2020 · 6 Sep · Shift 1

If $f(x+y) = f(x)f(y)$ and $\sum_{x=1}^{\infty} f(x) = 2$, $x, y \in N$, where N is the set of all natural number, then the value of $\frac{f(4)}{f(2)}$ is :

- (A) $\frac{2}{3}$ (B) $\frac{1}{9}$
(C) $\frac{1}{3}$ (D) $\frac{4}{9}$

[Step-by-step solution ► prepwisar.in/questions/m3h2mPIBYe](https://www.prepwisar.in/questions/m3h2mPIBYe)

Q57 JEE Main 2020 · 4 Sep · Shift 1

Suppose a differentiable function $f(x)$ satisfies the identity

$f(x+y) = f(x) + f(y) + xy^2 + x^2y$, for all real x and y .

$\lim_{x \rightarrow 0} \frac{f(x)}{x} = 1$, then $f'(3)$ is equal to _____.

Numerical answer — enter the value.

[Step-by-step solution ► prepwisar.in/questions/EQocRjDzKa](https://www.prepwisar.in/questions/EQocRjDzKa)

Let $f : \mathbb{R} \rightarrow \mathbb{R}$ be a function which satisfies

$f(x + y) = f(x) + f(y) \forall x, y \in \mathbb{R}$. If $f(1) = 2$ and

$g(n) = \sum_{k=1}^{(n-1)} f(k)$, $n \in \mathbb{N}$ then the value of n , for which $g(n) = 20$, is :

(A) 20

(B) 9

(C) 5

(D) 4

[Step-by-step solution ► prepwisser.in/questions/wAG8fu5hoZ](https://www.prepwisser.in/questions/wAG8fu5hoZ)

Answer key — Functions (Advanced)

Numbers match the question numbers above. For full working, open the solution link under each question.

1	18	2	D	3	D	4	C	5	D	6	D	7	C	8	C
9	D	10	C	11	C	12	C	13	D	14	C	15	A	16	A
17	B	18	B	19	C	20	C	21	B	22	C	23	D	24	B
25	C	26	D	27	C	28	1010	29	C	30	A	31	B	32	C
33	A	34	432	35	D	36	3	37	C	38	10	39	A	40	B
41	D	42	12	43	B	44	3395	45	99	46	248	47	C	48	B
49	C	50	490	51	3	52	A	53	2	54	D	55	5	56	D
57	10	58	C												

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