# MATHS

# BOOKS - CENGAGE MATHS (HINGLISH)

# INEQUALITIES AND MODULUS

## Subjective

**1.** Solve $\frac{2x+3}{x^2+x-12} < \frac{1}{2}$.

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**2.** Solve $\frac{1}{x-2}+\frac{1}{x-1}>\frac{1}{x}$.

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**3.** $\left(\sqrt{8+2x-x^2}>6-3x\right)$

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**4.** Solve, $\frac{\sqrt{2x-1}}{x-2}<1$.

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**5.** Solve, $\sqrt{x-6}-\sqrt{10-x} \geq 1$.

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**6.** Solve, $\frac{1-\sqrt{21-4x-x^2}}{x+1} \geq 0$.

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**7.** Solve $|x|^2-|x|+4=2x^2-3|x|+1$.

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**8.** Solve the simultaneous equations $|x+2|+y=5, x-|y|=1$ Find x.

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**9.** Solve $x-\sqrt{1-|x|}<0$.

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**10.** Solve $||x-1|-2|=|x-3|$.

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**11.** Solve : $(|x-1|-3)(\ |\ x+2)-5)<0.$

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**12.** For $a,\ b \in R$ prove that

$$\frac{|a+b|}{1+|a+b|} \leq \frac{|a|}{1+|a|}+\frac{|b|}{1+|b|}$$

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## Single Correct Answer

**1.** If $f(x) = ax^2 + bx + c$ and $f(-1) \geq -4$, $f(1) \leq 0$ and $f(3) \geq 5$, then the least value of $a$ is

A. $1/4$

B. $1/8$

C. $1/3$

D. $-1/3$

**Answer: B**

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**2.** The complete set of values of $x$ for which

$$\frac{x^3(x-1)^2(x+4)}{(x+1)(x-3)} \geq 0 \text{ is}$$

A. $(-\infty, -4] \cup (-1, 0] \cup (3, \infty) \cup \{1\}$

B. $(-\infty, -4] \cup (-1, 0] \cup (3, \infty) \cup \{-1\}$

C. $[-4, -1) \cup [0, 1) \cup (3, \infty)$

D. $[-4, -1) \cup [0, 1] \cup (3, \infty)$

**Answer: A**

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**3.** The set of all values of $x$ for which

$$\frac{(x+1)(x-3)^2(x-5)(x-4)^3(x-2)}{x} < 0$$

A. $(-\infty, -1) \cup (0, 2) \cup (4, 5)$

B. $(-1, 0) \cup (2, 4) \cup (5, \infty)$

C. $(-1, 0) \cup (2, 3) \cup (4, 5)$

D. $(-\infty, -1) \cup (0, 2) \cup [3, 5)$

**Answer: A**

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**4.** The solution set of inequality

$$\frac{(e^x-1)(2x-3)(x^2+x+2)}{(\sin x-2)(x+1)x} \leq 0$$

A. $\left[\frac{3}{2}, \infty\right)$

B. $(-\infty, -1) \cup \left[\frac{3}{2}, \infty\right)$

C. $(-1, 0) \cup \left[\frac{3}{2}, \infty\right)$

D. $R - \{0, -1\}$

**Answer: B**

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**5.** The solution set of inequality

$$\frac{1}{2^x - 1} > \frac{1}{1 - 2^{x-1}}$$ is

A. $(1, \infty)$

B. $(o, \log_2(4/3))$

C. $(-1, \infty)$

D. $(o, \log_2(4/3)) \cup (1, \infty)$

**Answer: D**

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6. Let $A = \{x : x^2 - 4x + 3 < 0, x \in R\}$

$B = \{x : 2^{1-x} + p \leq 0, x^2 - 2(p+7)x + 5 \leq 0\}$

If $B \subseteq A$, then $p \in$

A. $[-4, -1]$

B. $[-4, \infty)$

C. $(-\infty, 1)$

D. $[0, 1]$

**Answer: A**

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**7.** Let $a, b > 0$ satisfies $a^3 + b^3 = a - b$. Then

A. $a^2 + b^2 = 1$

B. $a^2 + ab + b^2 < 1$

C. $a^2 + b^2 > 1$

D. none of these

**Answer: B**

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**8.** The number of integers satisfying $|2x-3|+|x+5| \leq |x-8|$ is

A. $5$

B. $6$

C. $7$

D. $8$

**Answer: C**

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**9.** Which of the following is not the solution of

$|2x + 5| - |x - 3| \geq |x + 8|$ ?

A. $(-\infty, -8]$

B. $[3, \infty)$

C. $(-8, 3)$

D. none of these

**Answer: C**

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**10.** The number of integral values of $x$ satisfying the equation $|x - |x - 4|\ | = 4$ is

A. $5$

B. $7$

C. $9$

D. infinite

**Answer: D**

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**11.** The solution of $|2x - 3| < |x + 2|$ is

A. $(-\infty, 1/3)$

B. $(1/3, 5)$

C. $(5, \infty)$

D. $(-\infty, 1/3) \cup (5, \infty)$

**Answer: B**

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**12.** The solution set of the inequation $\left|\frac{1}{x}-2\right|<4$, is

A. $(-\infty, -1/2)$

B. $(1/6, \infty)$

C. $(-1/2, 1/6)$

D. $(-\infty, -1/2) \cup (1/6, \infty)$

**Answer: D**

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**13.** The solution of $\left|x + \frac{1}{x}\right| > 2$ is

A. $R - \{0\}$

B. $R - \{-1, 0, 1\}$

C. $R - \{1\}$

D. $R - \{-1, 1\}$

**Answer: B**

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**14.** The solution of the inequality $\frac{|x+2|-|x|}{\sqrt{8-x^3}} \geq 0$ is

A. $[-1, 2]$

B. $[1, 2]$

C. $[-1, 1]$

D. $[0, 3\sqrt{4})$

**Answer: A**

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**15.** If $\left|\frac{12x}{4x^2+9}\right| \leq 1$, then

A. $x \in R$

B. $x \in [-3, 3]$

C. $x \in [-1, \infty)$

D. $x \in (-\infty, 2]$

**Answer: A**

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**16.** Let a,b,c,d be real numbers such that $|a-b|=2$, $|b-c|=3$, $|c-d|=4$ Then the sum of all possible values of $|a-d|=$

A. $9$

B. $18$

C. $24$

D. $30$

**Answer: B**

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**17.** The number of solutions of the equation

$$\sqrt{x^2} - \sqrt{(x-1)^2} + \sqrt{(x-2)^2} = \sqrt{5}$$ is

A. $0$

B. $1$

C. $2$

D. More than $2$

**Answer: C**

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**18.** If $\left|x^2-2x-8\right|+\left|x^2+x-2\right|=3|x+2|$,

then the set of all real values of $x$ is

A. $[1,4]\cup\{-2\}$

B. $[1,4]$

C. $[-2,1]\cup[4,\infty)$

D. $(-\infty,-2]\cup[1,4]$

**Answer: A**

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**19.** The number of integers satisfying the equation $|x| + \left|\frac{4 - x^2}{x}\right| = \left|\frac{4}{x}\right|$ is

A. $5$

B. $4$

C. $6$

D. $7$

**Answer: B**

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**20.** The equation

$$|2ax - 3| + |ax + 1| + |5 - ax| = \frac{1}{2}$$

possesses

A. Infinite number of real solutions for some

$a \in R$

B. finitely many real solutions for some

$a \in R''$

C. no real solutions for some $a \in R$

D. no real solutions $a \in R$

**Answer: D**

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**21.** The set of values of $x$ satisfying $\left|\frac{x^2-5x+4}{x^2-4}\right| \leq 1$ is

A. $\left[0, \frac{8}{5}\right] \cup \left[\frac{5}{2}, \infty\right)$

B. $\left[\frac{8}{5}, \infty\right]$

C. $[-\infty, -2]$

D. $R$

**Answer: A**

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