

IPMAT / JIPMAT / IIM-B — PYQ Practice Sheet

Algebra: Polynomials & Quadratic Equations

IIM Bangalore (BBA-DBE) 2024 Slot 1 | Algebra > Quadratic Equations | Medium

Q1. The roots of the equation $x^2 + 18x - 703 = 0$ are given as a and b , with $a > b$. The roots of the equation $x^2 - 10x - 336 = 0$ are given as c and d , with $c > d$. Which of the options below gives the correct relation between a , b , c , and d ?

- (a) $a > b > c > d$
- (b) $a > c > b > d$
- (c) $c > a > b > d$
- (d) $c > a > d > b$

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Q2. If the equation $(m - 3)x^2 - 2mx + 5m = 0$ has real and positive roots, then the possible value(s) of m lies in:

- (a) [2, 3]
- (b) (2, 3.8)
- (c) (3, 3.75]
- (d) [3.1, 4)

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Q3. Regarding the function $f(x) = x^2 - 5x + 1$ and $g(x) = 1 - x - x^3$ on the set of real numbers, which of the following statements is **not** true?

- (a) The graph of f and g intersect at three different points.
- (b) The graph of f and g intersect at just one point with positive abscissa.
- (c) The graph of f and g intersect at just one point with negative abscissa.
- (d) The graph of f and g intersect at just one point above the x -axis.

2025: PYP 2025 | Algebra > Quadratic Equations | Medium

Q4. The roots of the equation $\sqrt{2}x^2 - (3/\sqrt{2})x + c = 0$ are p and $2p$.

Let $a > 0$, and one root of the equation $a^2x^2 + 12a - 7 = 0$ is $64(p^6 + c^{12})$.

What is the value of a ?

- (a) $3/4$
- (b) $1/2$
- (c) $1/4$
- (d) $1/32$

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Q5. If one of the roots of the equation $x^2 + ax + 3a = 0$ is 1, then its other root is

- (a) -0.25
- (b) -0.75
- (c) 3

(d) Will depend on the value of a

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Q6. If $x = 28^{1/3}$ and $y = 27^{1/3}$, find the value of $x + y - 1/(x^2 + xy + y^2)$.

- (a) 3
 - (b) 6
 - (c) $2 + 28^{1/3}$
 - (d) None of these
-

BMSAT Kozhikode 2025 | Algebra > Identities | Medium

Q7. Say $y = 3\sqrt{2} - 4$, find $y^2 + 1/y^2$.

- (a) $17/4$
 - (b) $51 - 12\sqrt{2}$
 - (c) None of these
 - (d) $137 - 96\sqrt{2}$
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Q8. The zeroes of $ax^2 + bx + c = 0$ are in the ratio 1 : 2 (assume the coefficients to be non-zero). Which of these is one of the zeroes?

- (a) $2c/b$
 - (b) $-2b/(3a)$
 - (c) $3c/b$
 - (d) $-c/(2b)$
-

BMSAT Kozhikode 2025 | Algebra > Polynomials | Hard

Q9. What must be added to $x^4 + 2x^3 - 2x^2 + x - 1$ so that the result is exactly divisible by $x^2 + 2x - 3$?

- (a) $2 - x$
 - (b) $x - 1$
 - (c) $x^2 + x - 1$
 - (d) None of these
-

BMSAT Kozhikode 2025 | Algebra > Identities | Medium

Q10. If $x^2 + 1/x^2 = 83$ and $x > 1$, then the value of $x^3 - 1/x^3$ is

- (a) 81
 - (b) 756
 - (c) 729
 - (d) None of these
-

2026: 2026 | Algebra > Polynomials | Medium

Q11. If $\sin \theta$ and $\cos \theta$ are the roots of the quadratic equation $px^2 + qx + r = 0$ ($p \neq 0$), then which of the following relation holds good?

- (a) None of these

- (b) $q^2 + p^2 + 2pr = 0$
(c) $p^2 - q^2 = 2pr$
(d) $(q - p)^2 = 2pr$
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2026: 2026 | Algebra > Polynomials | Medium

Q12. Say for positive quantities a, b , $a + b$ equals $a^2 + ab + b^2$. Choose the nearest value to b if a is given as 0.5.

- (a) $2/3$
(b) 0.8
(c) 0.5
(d) 0
-

2026: 2026 | Algebra > Polynomials | Medium

Q13. What is the condition for $x^2 + (a + b)x + ab$, with a and b non-zero, to have real roots?

- (a) none of these
(b) $a > b$
(c) $ab < 0$
(d) $a < b$
-

IPMAT Indore 2019 | Algebra > Identities | Hard

Q14. If a, b, c are real numbers and $a^2 + b^2 + c^2 = 1$, then the set of values $ab + bc + ca$ can take is:

- (a) $[-1, 2]$
(b) $[-1/2, 2]$
(c) $[-1, 1]$
(d) $[-1/2, 1]$
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IPMAT Indore 2023 | Algebra > Polynomials | Medium

Q15. If the harmonic mean of the roots of the equation $(5 + \sqrt{2})x^2 - bx + 8 + 2\sqrt{5} = 0$ is 4, then the value of b is

- (a) 2
(b) $4 - \sqrt{5}$
(c) 3
(d) $4 + \sqrt{5}$
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Q16. The number of real solutions of the equation $(x^2 - 15x + 55)^{x^2 - 5x + 6} = 1$ is:

Entered answer: _____

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Q17. The difference between the maximum real root and the minimum real root of the equation $(x^2 - 5)^4 + (x^2 - 7)^4 = 16$ is

- (a) $\sqrt{10}$

- (b) $2\sqrt{5}$
- (c) $\sqrt{7}$
- (d) $2\sqrt{7}$

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Q18. If a_1, a_2, \dots, a_8 are the roots of the equation $x^8 + x^7 + \dots + x + 1 = 0$, then the value of $a_1^{2025} + a_2^{2025} + \dots + a_8^{2025}$ is

- (a) 0
- (b) 2
- (c) 8
- (d) 4

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Q19. If $8x^2 - 2kx + k = 0$ is a quadratic equation in x , such that one of its roots is p times the other, and p, k are positive real numbers, then k equals

- (a) $(p + 1/p)$
- (b) $2(p + 1/p)$
- (c) $2(\sqrt{p} + 1/\sqrt{p})^2$
- (d) $(\sqrt{p} + 1/\sqrt{p})^2$

Answer Key

Q1: (d)	Q2: (c)	Q3: (d)	Q4: (b)	Q5: (b)
Q6: (b)	Q7: (c)	Q8: (b)	Q9: (d)	Q10: (b)
Q11: (a)	Q12: (b)	Q13: (a)	Q14: (d)	Q15: (d)
Q16: 6	Q17: (d)	Q18: (c)	Q19: (c)	