



A Premier Institute for Pre-Medical & Pre Engineering

**SRI VIDYA
ARADHANA
ACADEMY**
"Transforming Your DREAMS Into Reality...!"**NEET/JEE**
Topic: Basic Mathematics

Mathematics

Assignment 08 • Rational Inequalities

Chetan Sir

"Small steps, repeated daily, outrun big leaps taken rarely."

- **Never cross-multiply** by an expression of unknown sign — bring everything to one side and form a **single fraction** first.
- A **denominator** root is always **hollow** (excluded from the answer); a factor with **no real roots** ($D < 0$) never changes sign, so it can be **dropped** once you've checked whether it's always positive or always negative.
- At a root of **even multiplicity** the graph only **touches** zero (no sign change); at **odd multiplicity** it **crosses** (sign changes).
- A repeated algebraic block appearing more than once $\Rightarrow$ **substitute** t for it before solving.

Practice set from Problems in Mathematics — Q27–103, numbered to match the original source.

27. $(x-1)(3-x)(x-2)^2 > 0.$

41. $\frac{5x+8}{4-x} < 2.$

28. $\frac{6x-5}{4x+1} < 0.$

42. $\frac{x-1}{x+3} > 2.$

29. $\frac{2x-3}{3x-7} > 0.$

43. $\frac{7x-5}{8x+3} > 4.$

30. $\frac{0.5}{x-x^2-1} < 0.$

44. $\frac{x}{x-5} > \frac{1}{2}.$

31. $\frac{x^2-5x+6}{x^2+x+1} < 0.$

45. $\frac{5x-1}{x^2+3} < 1.$

32. $\frac{x^2+2x-3}{x^2+1} < 0.$

46. $\frac{x-2}{x^2+1} < -\frac{1}{2}.$

33. $\frac{(x-1)(x+2)^2}{-1-x} < 0.$

47. $\frac{x+1}{(x-1)^2} < 1.$

34. $\frac{x^2+4x+4}{2x^2-x-1} > 0.$

48. $\frac{x^2-7x+12}{2x^2+4x+5} > 0.$

35. $x^4-5x^2+4 < 0.$

49. $\frac{x^2+6x-7}{x^2+1} \leq 2.$

36. $x^4-2x^2-63 \leq 0.$

50. $\frac{x^4+x^2+1}{x^2-4x-5} < 0.$

37. $\frac{3}{x-2} < 1.$

51. $\frac{1+3x^2}{2x^2-21x+40} < 0.$

38. $\frac{1}{x-1} \leq 2.$

52. $\frac{1+x^2}{x^2-5x+6} < 0.$

39. $\frac{4x+3}{2x-5} < 6.$

53. $\frac{x^4+x^2+1}{x^2-4x-5} > 0.$

40. $\frac{5x-6}{x+6} < 1.$

$$54. \frac{1-2x-3x^2}{3x-x^2-5} > 0.$$

$$55. \frac{x^2-5x+7}{-2x^2+3x+2} > 0.$$

$$56. \frac{2x^2-3x-459}{x^2+1} > 1.$$

$$57. \frac{x^2-1}{x^2+x+1} < 1.$$

$$58. \frac{x}{x^2-3x-4} > 0.$$

$$59. \frac{x^2+7x+10}{x+2/3} > 0.$$

$$60. \frac{3x^2-4x-6}{2x-5} < 0.$$

$$61. \frac{17-15x-2x^2}{x+3} < 0.$$

$$62. \frac{x^2-9}{3x-x^2-24} < 0.$$

$$63. \frac{x+7}{x-5} + \frac{3x+1}{2} \geq 0.$$

$$64. 2x^2 + \frac{1}{x} > 0.$$

$$65. \frac{x^2-x-6}{x^2+6x} \geq 0.$$

$$66. \frac{x^2-5x+6}{x^2-11x+30} < 0.$$

$$67. \frac{x^2-8x+7}{4x^2-4x+1} < 0.$$

$$68. \frac{x^2-36}{x^2-9x+18} < 0.$$

$$69. \frac{x^2-6x+9}{5-4x-x^2} \geq 0.$$

$$70. \frac{x-1}{x+1} < x.$$

$$71. \frac{1}{x+2} < \frac{3}{x-3}.$$

$$72. \frac{14x}{x+1} - \frac{9x-30}{x-4} < 0.$$

$$73. \frac{5x^2-2}{4x^2-x+3} < 1.$$

$$74. \frac{x^2-5x+12}{x^2-4x+5} > 3.$$

$$75. \frac{x^2-3x+24}{x^2-3x+3} < 4.$$

$$76. \frac{x^2-1}{2x+5} < 3.$$

$$77. \frac{x^2+1}{4x-3} > 2.$$

$$78. \frac{x^2+2}{x^2-1} < -2.$$

$$79. \frac{3x-5}{x^2+4x-5} > \frac{1}{2}.$$

$$80. \frac{2x+3}{x^2+x-12} \leq \frac{1}{2}.$$

$$81. \frac{5-2x}{3x^2-2x-16} < 1.$$

$$82. \frac{15-4x}{x^2-x-12} < 4.$$

$$83. \frac{1}{x^2-5x+6} \geq \frac{1}{2}.$$

$$84. \frac{(2-x^2)(x-3)^3}{(x+1)(x^2-3x-4)} \geq 0.$$

$$85. \frac{5-4x}{3x^2-x-4} < 4.$$

$$86. \frac{19-33x}{7x^2-11x+4} > 2.$$

$$87. \frac{0.5x+49}{10x^2+x-2} < \frac{1}{2}.$$

$$88. \frac{(x+2)(x^2-2x+1)}{4+3x-x^2} \geq 0.$$

$$89. \frac{4}{1+x} + \frac{2}{1-x} < 1.$$

$$90. 2 + \frac{3}{x+1} > \frac{2}{x}.$$

$$91. 1 + \frac{2}{x-1} > \frac{6}{x}.$$

$$92. \frac{x^4-3x^3+2x^2}{x^2-x-30} > 0.$$

$$93. \frac{x-1}{x} - \frac{x+1}{x-1} < 2.$$

$$94. \frac{2(x-3)}{x(x-6)} \leq \frac{1}{x-1}.$$

$$95. \frac{2(x-4)}{(x-1)(x-7)} \geq \frac{1}{x-2}.$$

$$96. \frac{2x}{x^2-9} \leq \frac{1}{x+2}.$$

$$97. \frac{1}{x-2} + \frac{1}{x-1} > \frac{1}{x}.$$

$$98. \frac{7}{(x-2)(x-3)} + \frac{9}{x-3} + 1 < 0.$$

$$99. \frac{20}{(x-3)(x-4)} + \frac{10}{x-4} + 1 > 0.$$

$$100. \frac{(x-2)(x-4)(x-7)}{(x+2)(x+4)(x+7)} > 1.$$

$$101. \frac{(x-1)(x-2)(x-3)}{(x+1)(x+2)(x+3)} > 1.$$

$$102. (x^2 + 3x + 1)(x^2 + 3x - 3) \geq 5.$$

$$103. (x^2 - x - 1)(x^2 - x - 7) < -5.$$

ANSWER KEY

$$27. (1, 2) \cup (2, 3)$$

$$30. (-\infty, +\infty)$$

$$33. (-\infty, -2) \cup (-2, -1) \cup (1, +\infty)$$

$$36. [-3, 3]$$

$$39. \left(-\infty, \frac{5}{2}\right) \cup \left(\frac{33}{8}, +\infty\right)$$

$$42. (-7, -3)$$

$$45. (-\infty, 1) \cup (4, +\infty)$$

$$48. (-\infty, 3) \cup (4, +\infty)$$

$$51. \left(\frac{5}{2}, 8\right)$$

$$54. (-\infty, -1) \cup \left(\frac{1}{3}, +\infty\right)$$

$$57. (-2, +\infty)$$

$$60. \left(-\infty, \frac{2-\sqrt{22}}{3}\right) \cup \left(\frac{2+\sqrt{22}}{3}, \frac{5}{2}\right)$$

$$63. [1, 3] \cup (5, +\infty)$$

$$66. (2, 3) \cup (5, 6)$$

$$69. (-5, 1) \cup \{3\}$$

$$72. (-1, 1) \cup (4, 6)$$

$$75. (-\infty, -1) \cup (4, +\infty)$$

$$78. (-1, 0) \cup (0, 1)$$

$$81. (-\infty, -\sqrt{7}) \cup (-2, \sqrt{7}) \cup \left(\frac{8}{3}, +\infty\right)$$

$$84. [-\sqrt{2}, -1) \cup (-1, \sqrt{2}] \cup [3, 4)$$

$$87. (-\infty, -\sqrt{10}) \cup \left(-\frac{1}{2}, \frac{2}{5}\right) \cup (\sqrt{10}, +\infty)$$

$$90. (-\infty, -2) \cup (-1, 0) \cup \left(\frac{1}{2}, +\infty\right)$$

$$93. (-\infty, -1) \cup \left(0, \frac{1}{2}\right) \cup (1, +\infty)$$

$$96. (-\infty, -3) \cup (-2, 3)$$

$$99. (-\infty, -2) \cup (-1, 3) \cup (4, +\infty)$$

$$102. (-\infty, -4] \cup [-2, -1] \cup [1, +\infty)$$

$$28. \left(-\frac{1}{4}, \frac{5}{6}\right)$$

$$31. (2, 3)$$

$$34. (-\infty, -2) \cup \left(-2, -\frac{1}{2}\right) \cup (1, +\infty)$$

$$37. (-\infty, 2) \cup (5, +\infty)$$

$$40. (-6, 3)$$

$$43. \left(-\frac{17}{25}, -\frac{3}{8}\right)$$

$$46. (-3, 1)$$

$$49. (-\infty, +\infty)$$

$$52. (2, 3)$$

$$55. \left(-\frac{1}{2}, 2\right)$$

$$58. (-1, 0) \cup (4, +\infty)$$

$$61. \left(-\frac{17}{2}, -3\right) \cup (1, +\infty)$$

$$64. \left(-\infty, -\frac{1}{\sqrt{2}}\right) \cup (0, +\infty)$$

$$67. (1, 7)$$

$$70. (-1, +\infty)$$

$$73. \left(-\frac{1+\sqrt{21}}{2}, \frac{\sqrt{21}-1}{2}\right)$$

$$76. \left(-\infty, -\frac{5}{2}\right) \cup (-2, 8)$$

$$79. (-5, 1)$$

$$82. \left(-\infty, -\frac{3\sqrt{7}}{2}\right) \cup \left(-3, \frac{3\sqrt{7}}{2}\right) \cup (4, +\infty)$$

$$85. \left(-\infty, -\frac{\sqrt{7}}{2}\right) \cup \left(-1, \frac{\sqrt{7}}{2}\right) \cup \left(\frac{4}{3}, +\infty\right)$$

$$88. (-\infty, -2] \cup (-1, 4)$$

$$91. (-\infty, 0) \cup (1, 2) \cup (3, +\infty)$$

$$94. (-\infty, 0) \cup (1, 6)$$

$$97. (-\sqrt{2}, 0) \cup (1, \sqrt{2}) \cup (2, +\infty)$$

$$100. (-\infty, -7) \cup (-4, -2)$$

$$103. (-2, -1) \cup (2, 3)$$

$$29. \left(-\infty, \frac{3}{2}\right) \cup \left(\frac{7}{3}, +\infty\right)$$

$$32. (-3, 1)$$

$$35. (-2, -1) \cup (1, 2)$$

$$38. (-\infty, 1) \cup \left[\frac{3}{2}, +\infty\right)$$

$$41. (-\infty, 0) \cup (4, +\infty)$$

$$44. (-\infty, -5) \cup (5, +\infty)$$

$$47. (-\infty, 0) \cup (3, +\infty)$$

$$50. (-1, 5)$$

$$53. (-\infty, -1) \cup (5, +\infty)$$

$$56. (-\infty, -20) \cup (23, +\infty)$$

$$59. (-5, -2) \cup \left(-\frac{2}{3}, +\infty\right)$$

$$62. (-\infty, -3) \cup (3, +\infty)$$

$$65. (-\infty, -6) \cup [-2, 0] \cup [3, +\infty)$$

$$68. (-6, 3)$$

$$71. \left(-\frac{9}{2}, -2\right) \cup (3, +\infty)$$

$$74. \left(\frac{1}{2}, 3\right)$$

$$77. \left(\frac{3}{4}, 1\right) \cup (7, +\infty)$$

$$80. (-\infty, -4) \cup [-3, 3] \cup [6, +\infty)$$

$$83. [1, 2) \cup (3, 4]$$

$$86. \left(-\frac{11+\sqrt{737}}{28}, \frac{4}{7}\right) \cup \left(\frac{\sqrt{737}-11}{28}, 1\right)$$

$$89. (-\infty, -1) \cup (1, +\infty)$$

$$92. (-\infty, -5) \cup (1, 2) \cup (6, +\infty)$$

$$95. (1, 2) \cup (7, +\infty)$$

$$98. (-5, 1) \cup (2, 3)$$

$$101. (-\infty, -3) \cup (-2, -1)$$