

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

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

$$5. \frac{2(x-4)}{(x-1)(x-7)} \leq \frac{1}{x-2}.$$

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

$$9. \frac{1}{x+1} - \frac{2}{x^2-x+1} < \frac{1-2x}{x^3+1}.$$

$$11. x^4 - 5x^2 + 4 < 0.$$

$$13. \frac{(x-2)(x-4)(x-7)}{(x+2)(x+4)(x+3)} > 1$$

$$15. \frac{x^2-36}{x^2-9x+18} < 0.$$

$$17. (x+1)(x-3)^2(x-5)(x-4)^2(x-2) < 0.$$

$$19. (x+3)^{553}(3x-2)^{5555}(7-x)^{343}(5x+8)^{10^{10}} < 0$$

$$21. \frac{(x+8)^{3351}(1-x)^{365}}{(x+5)^{103}(x-2)^{444}} \geq 0$$

$$23. \frac{x^2+4x+4}{2x^2-x-1} > 0.$$

$$25. \frac{x^2-6x+9}{5-4x-x^2} \geq 0.$$

$$27. \frac{(x+2)(x^2-2x+1)}{4+3x-x^2} \geq 0.$$

$$29. 1 + \frac{12}{x^2} < \frac{7}{x}$$

$$31. \frac{(x+7)^{N^{45}}(x-5)^3}{(x+11)^{7853}(x+4)(3-x)(x-6)^{N+1982}} \geq 0, \text{ where } N \text{ is odd number}$$

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

$$4. \frac{2x}{x^2-9} \leq \frac{1}{x+2}.$$

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

$$8. \frac{20}{(x-3)(x-4)} + \frac{10}{x-4} + 1 > 0.$$

$$10. \frac{x+4}{x^2-9} - \frac{2}{x+3} < \frac{4x}{3x+x^2}.$$

$$12. x^4 - 2x^2 - 63 \leq 0.$$

$$14. \frac{(x-1)(x-2)(x-3)}{(x+1)(x+2)(x+3)} > 1$$

$$16. (x-1)(3-x)(x-2)^2 > 0.$$

$$18. (x-1)^2(x+1)^3(x-4) < 0.$$

$$20. \frac{(x-1)^2(x+1)^3}{x^4(x-2)} \leq 0.$$

$$22. \frac{(x-1)(x+2)^2}{-1-x} < 0.$$

$$24. \frac{x^2-8x+7}{4x^2-4x+1} < 0.$$

$$26. \frac{x^4-3x^3+2x^2}{x^2-x-30} > 0.$$

$$28. \frac{(2-x^2)(x-3)^3}{(x+1)(x^2-3x-4)} \geq 0.$$

$$30. \frac{x+1}{(x-1)^2} < 1.$$

32.  $\frac{x^{10^{10}}(x+2)^{N!}(x+1)^{N!N!}}{(x+6)^3(x-3)^{451}(x+3)^{N!-1}(2-x)} \geq 0$ , where N is natural number  $\geq 2$ .
33.  $\frac{x^t(x-1)^{T+3^{97}}}{(x+7)^T(10-x)^{1999+t!}} \leq 0$ , where t, T are primes satisfying,  $T^2 - 2t^2 = 1$ .
34.  $\frac{(x+8)^{U\{1!+2!+3!+\dots+1997\}}(x+4)(8-x)^{5555^{3337^9}}}{(x-4)^5(x+5)^2} \leq 0$ , where  $u\{n\}$  denotes unit digit of n.
35.  $\frac{(x+2)^{44^{55}}(-3-x)^{58}}{(1+x)^{333^{444}}(2x-4)(x-3)^T} < 0$  where T satisfies the relation  $(3!)(5!)(7!) = T!..$

### Answer key

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|--|--|---|
| 1. $(-\infty, -1) \cup (0, 1/2) \cup (1, +\infty)$               | 2. $(-\infty, 0) \cup (1, 6)$                          | 3. $(-\sqrt{2}, 0) \cup (1, \sqrt{2}) \cup (2, +\infty)$      |
| 4. $(-\infty, -3) \cup (-2, 3)$                                  | 5. $(-\infty, -1) \cup (2, 7)$                         | 6. $x \in [-\sqrt{2}, 0] \cup [1, \sqrt{2}] \cup [2, \infty]$ |
| 7. $x \in (-5, 1) \cup (2, 3)$                                   | 8. $(-\infty, -2) \cup (-1, 3) \cup (4, +\infty)$      | 9. $(-\infty, 2) - \{1\}$                                     |
| 10. $(-3, 0) \cup (0, 3) \cup \left(\frac{22}{5}, \infty\right)$ | 11. $(-2, -1) \cup (1, 2)$                             | 12. $[-3, 3]$   |
| 13. $(-\infty, -7) \cup (-4, -2)$                                | 14. $(-\infty, -3) \cup (-2, -1)$                      | 15. $(-6, 3)$   |
| 16. $(1, 2) \cup (2, 3)$   | 17. $(-\infty, -1) \cup (2, 5) - \{3, 4\}$             | 18. $(-1, 1) \cup (1, 4)$                                     |
| 19. $x \in (-3, -8/5) \cup (-8/5, 2/3) \cup (7, \infty)$         | 20. $[-1, 0] \cup (0, 2)$                              | 21. $(-\infty, -2) \cup (-2, -1/2) \cup (1, +\infty)$         |
| 21. $x \in \{-\infty\} \cup (-5, 1]$                             | 22. $(-\infty, -2) \cup (-2, -1) \cup (1, +\infty)$    | 23. $(-\infty, -2) \cup (-2, -1/2) \cup (1, +\infty)$         |
| 24. $(1, 7)$   | 25. $(-5, 1) \cup \{3\}$                               | 26. $(-\infty, -5) \cup (1, 2) \cup (6, +\infty)$             |
| 27. $(-\infty, -2) \cup (-1, 4)$                                 | 28. $[-\sqrt{2}, -1) \cup (-1, \sqrt{2}) \cup [3, 4)$  | 29. $(3, 4)$  |
| 30. $(-\infty, 0) \cup (3, +\infty)$                             | 31. $x \in (-1, 1, -7] \cup (-4, 3) \cup [5, 6)$       | 32. $(-6, -3) \cup (2, 3) \cup \{-2, -1, 0\}$                 |
| 33. $x \in (-\infty, -7) \cup \{0, 1\} \cup (10, \infty)$        | 34. $x \in (-\infty, 8) \cup [-4, 4) \cup [8, \infty)$ | 35. $x \in (-1, 2)$   |

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## Answer key (DPP 1)

1.  $[1, 4/3]$       2.  $(-2/3, 3)$       3.  $(-\infty, -1) \cup (15, +\infty)$       4.  $[-2, 1]$
5.  $(-\infty, -3) \cup (2, 3)$       6.  $(-1/4, 5/6)$       7.  $(-\infty; 3/2) \cup (7/3, +\infty)$       8.  $\phi$
9.  $(-\infty, +\infty)$       10.  $(2, 3)$       11.  $(-3, 1)$       12.  $x \in (-\infty, -1) \cup (5, \infty)$
13.  $(-\infty, 3) \cup (4, +\infty)$       14.  $(5/2, 8)$       15.  $(-\infty, -1) \cup (5, +\infty)$       16.  $(-\infty, -1) \cup (1/3, +\infty)$
17.  $(-1/2, 2)$       18.  $(-1, 0) \cup (4, +\infty)$       19.  $(-5, -2) \cup (-2/3, +\infty)$
20.  $(-\infty, (2 - \sqrt{22})/3) \cup ((2 + \sqrt{22})/3, 5/2)$
21.  $(-17/2, -3) \cup (1, +\infty)$       22.  $(-\infty, -3) \cup (3, +\infty)$       23.  $(-\infty, -6) \cup [-2, 0] \cup [3, \infty)$
24.  $(2, 3) \cup (5, 6)$       25.  $(-\infty, -3) \cup (-2, +\infty)$       26.  $(-\infty, -3) \cup [1, 4]$       27.  $(-\infty + \infty)$       28.  $\phi$
29.  $x \in (-3, 1)$       30.  $[1, 3] \cup (5, +\infty)$       31.  $(-\infty, -1/\sqrt[3]{2}) \cup (0, +\infty)$       32.  $(-1, 1) \cup (4, 6)$
33.  $(-\infty, -7) \cup (-5, 3)$       34.  $(-2, -1] \cup (0, 2]$       35.  $(0, 3)$       36.  $(-1, +\infty)$
37.  $(-9/2, -2) \cup (3, +\infty)$       38.  $(-\infty, 5/2) \cup (33/8, +\infty)$       39.  $(-6, 3)$
40.  $(-\infty, \frac{16}{7}) \cup (4, \infty)$       41.  $(-7, -3)$       42.  $(-17/25, -3/8)$       43.  $(-\infty, -5) \cup (5, +\infty)$
44.  $(-\infty, 2) \cup (5, +\infty)$       45.  $(-\infty, 1) \cup [\frac{3}{2}, \infty)$       46.  $(-\infty, 0) \cup (1, +\infty)$       47.  $(-\infty, -5/2) \cup (-2, 8)$
48.  $(3/4, 1) \cup (7, +\infty)$       49.  $(-1, 0) \cup (0, 1)$       50.  $(-5, 1)$       51.  $(-\infty, -4) \cup (-3, 3) \cup (6, +\infty)$
52.  $(-\infty, -\sqrt{7}) \cup (-2, \sqrt{7}) \cup [8/3, +\infty)$       53.  $(-\infty, -\frac{\sqrt{63}}{2}) \cup (-3, \frac{\sqrt{63}}{2}) \cup (4, +\infty)$       54.  $[1, 2) \cup (3, 4]$
55.  $(-\infty, -\sqrt{7}/2) \cup (-1, \sqrt{7}/2) \cup (4/3, +\infty)$       56.  $(-(11 + \sqrt{737})/28, 4/7) \cup ((\sqrt{737} - 11)/28, 1)$
57.  $(-\infty, 1) \cup (4, +\infty)$       58.  $\phi$       59.  $(-2, +\infty)$       60.  $(-\infty, +\infty)$       61.  $(-\infty, -20) \cup (23, +\infty)$
62.  $(-(1 + \sqrt{21})/2, (\sqrt{21} - 1)/2)$       63.  $(1/2, 3)$       64.  $(-\infty, -1) \cup (4, +\infty)$
65.  $(-\infty, -\sqrt{10}) \cup (-1/2, 2/5) \cup (\sqrt{10}, +\infty)$       66.  $(-\infty, -1) \cup (1, +\infty)$       67.  $(-\infty, 0) \cup (1, \infty)$
68.  $(-\infty, 0) \cup (1, 2) \cup (3, +\infty)$       69.  $(-2, -1) \cup (2, +\infty)$       70.  $(-\infty, -1] \cup (5, 6]$       71.  $[-3, 0) \cup [20, +\infty)$
72.  $(-\infty, -1.4] \cup (2, 2.6]$       73.  $(-\infty, -1) \cup (1, 3)$       74.  $(-2, (3 - \sqrt{17})/2] \cup (0, 2) \cup [(3 + \sqrt{17})/2, +\infty)$