NTS GAT General Past Papers Questions

Quantitative – Exam No. 21

Solving Variables

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Formulas:

$$(a + b)^2 = a^2 + b^2 + 2ab$$

$$(a - b)^2 = a^2 + b^2 - 2ab$$

$$a^2 - b^2 = (a + b)(a - b)$$

$$(a + b)^3 = a^3 + b^3 + 3ab(a + b)$$

$$(a - b)^3 = a^3 - b^3 - 3ab(a - b)$$

$$a^3 + b^3 = (a + b)(a^2 - ab + b^2)$$

$$a^3 - b^3 = (a - b)(a^2 + ab + b^2)$$

$$(a + b + c)^2 = a^2 + b^2 + c^2 + 2ab + 2bc + 2ca$$

$$\sqrt{a + b} \neq \sqrt{a} + \sqrt{b}$$

$$\sqrt{a - b} \neq \sqrt{a} - \sqrt{b}$$

$$\sqrt{a \times b} = \sqrt{a} \times \sqrt{b}$$

$$\sqrt{a \div b} = \sqrt{a} \div \sqrt{b}$$

Exercise:

1. Solve for x:

$$-15x - 5 = -10x - 15$$

Solution:

$$-15x + 10x = -15 + 5$$

$$-5x = -10$$

$$x = \frac{10}{5} = 2$$

2. Solve for x+4: (PP)

$$5x + 11 = 31$$

Solution:

$$5x = 31 - 11$$
$$5x = 20$$
$$x = \frac{20}{5} = 4$$

Solving for x+4,

$$x + 4 = 4 + 4$$
$$x + 4 = 8$$

3. Solve for x/6: (PP)

$$\frac{x}{4} + \frac{x}{3} = 7$$

Solution:

$$\frac{3x + 4x}{12} = 7$$
$$3x + 4x = 7 \times 12$$
$$7x = 84$$
$$x = 12$$

Dividing both sides by "6", we get:

$$\frac{x}{6} = \frac{12}{6}$$
$$\frac{x}{6} = 2$$

4. If $x - y = 4$, then find $5x - 5y$? (PP)

Solution:

$$x - y = 4$$

Multiplying both sides with "5", we get:

$$5(x - y) = 5(4)$$
$$5x - 5y = 20$$

5. If $2p + 5 = 20$, find $2p - 5 =$? (PP)

Solution:

$$2p + 5 = 20$$

Subtracting 10 from both sides of the equation, we get:

$$2p + 5 - 10 = 20 - 10$$
$$2p - 5 = 10$$

6. If $x = 2$, find $\left[\left(x^2 + \frac{1}{x^2}\right) - \left(x + \frac{1}{x}\right)\right]$? (PP)

Solution:

$$= \left[\left(x^2 + \frac{1}{x^2}\right) - \left(x + \frac{1}{x}\right)\right]$$
$$= \left[\left(2^2 + \frac{1}{2^2}\right) - \left(2 + \frac{1}{2}\right)\right]$$
$$= \left[4 + \frac{1}{4} - 2 - \frac{1}{2}\right]$$
$$= \left[\frac{16 + 1 - 8 - 2}{4}\right]$$
$$= \frac{17 - 10}{4}$$
$$= \frac{7}{4}$$

7. If $m = -1$ and $n = -3$, find $m^2 - 4mn + n$? (PP)

Solution:

$$m^2 - 4mn + n = (-1)^2 - 4(-1)(-3) + (-3)$$
$$m^2 - 4mn + n = 1 - 12 - 3$$
$$m^2 - 4mn + n = 1 - 15$$
$$m^2 - 4mn + n = -14$$

8. If $x = -2$ and $y = -3$, find $3(x^2y) - 5(xy^3)$?

Solution:

$$= 3(x^2y) - 5(xy^3)$$
$$= 3((-2)^2 \times (-3)) - 5((-2) \times (-3)^3)$$
$$= 3((4) \times (-3)) - 5((-2) \times (-27))$$
$$= 3(-12) - 5(54)$$
$$= -36 - 270$$
$$= -306$$

9. Find the value of ab if:

$$10a - 6 = \frac{70}{b}$$

Solution:

$$10a - 6 = \frac{70}{b}$$
$$(10a - 6) \times b = 70$$
$$10ab - 6b = 70$$
$$10ab = 70 + 6b$$
$$ab = \frac{70 + 6b}{10}$$

10. Find the value of $3x^2 + 6xy + 3y^2$ if:

$$x + y = k$$

Solution:

$$= 3x^2 + 6xy + 3y^2$$
$$= 3(x^2 + 2xy + y^2)$$
$$= 3(x + y)^2$$

Substituting the value of $x + y$ in above equation, we get:

$$= 3k^2$$

11. Find the value of x and y? (PP)

$$x + y = 18$$

$$x - y = 14$$

Solution:

$$x + y = 18 \dots (1)$$

$$x - y = 14 \dots (2)$$

Adding equation (1) and equation (2), we get:

$$2x = 32$$

$$x = 16$$

Put the value of x in equation (1), we get:

$$y = 2$$

$$(x, y) = (16, 2)$$

12. Find the value of x and y? (PP)

$$2x + y = 12$$

$$5x - 2y = 21$$

Solution:

$$2x + y = 12 \dots (1)$$

$$5x - 2y = 21 \dots (2)$$

Multiplying equation (1) with "2", we get:

$$4x + 2y = 24 \dots (3)$$

Adding it in equation (2) and equation (3), we get:

$$9x = 45$$

$$x = 5$$

Put the value of x in equation (1), we get:

$$y = 2$$

$$(x, y) = (5, 2)$$

13. Find the value of x and y?

$$x = -3 + y$$
$$-y - 9 = 2x$$

Solution:

$$x = -3 + y \dots (1)$$
$$-y - 9 = 2x \dots (2)$$

Put the value of x from equation (1) in equation (2), we get:

$$-y - 9 = 2(-3 + y)$$
$$-y - 9 = -6 + 2y$$
$$-y - 2y = -6 + 9$$
$$-3y = 3$$
$$y = -1$$

Put the value of y in equation (1), we get:

$$x = -3 - 1$$
$$x = -4$$
$$(x, y) = (-4, -1)$$

14. Find the value of x? (PP)

$$\frac{1}{15} + \frac{1}{30} = \frac{1}{x}$$

Solution:

$$\frac{2 + 1}{30} = \frac{1}{x}$$
$$\frac{3}{30} = \frac{1}{x}$$
$$\frac{1}{10} = \frac{1}{x}$$
$$x = 10$$

15. Find the value of x?

$$\frac{1}{11} - \frac{1}{x} = \frac{1}{7}$$

Solution:

$$\frac{1}{11} - \frac{1}{7} = \frac{1}{x}$$

$$\frac{7 - 11}{77} = \frac{1}{x}$$

$$-\frac{4}{77} = \frac{1}{x}$$

$$x = -\frac{77}{4}$$

16. Find the value of $\left(a^2 + \frac{1}{a^2}\right)$? (PP)

$$\left(a + \frac{1}{a}\right)^2 = 100$$

Solution:

$$(a)^2 + \left(\frac{1}{a}\right)^2 + 2(a)\left(\frac{1}{a}\right) = 100$$

$$a^2 + \frac{1}{a^2} + 2 = 100$$

$$a^2 + \frac{1}{a^2} = 100 - 2$$

$$a^2 + \frac{1}{a^2} = 98$$

17. Find the value of $(m + 1)(m - 1)$? (PP)

$$m^2 = 17$$

Solution:

$$= (m + 1)(m - 1)$$

$$= m^2 - m + m - 1$$

$$= m^2 - 1$$

Putting the value of m^2 in above equation, we get:

$$= 17 - 1$$

$$= 16$$

18. Simplify in the form of x? (PP)

$$\sqrt{\frac{x^2}{9}} + \sqrt{\frac{x^2}{16}}$$

Solution:

$$= \frac{\sqrt{x^2}}{\sqrt{9}} + \frac{\sqrt{x^2}}{\sqrt{16}}$$

$$= \frac{x}{3} + \frac{x}{4}$$

$$= \frac{4x + 3x}{12}$$

$$= \frac{7x}{12}$$

19. If $m - n = 5$ and $2m + 3n = 15$, then $m + n = ?$ (PP)

Solution:

$$m - n = 5 \ldots (1)$$

$$2m + 3n = 15 \ldots (2)$$

Multiplying equation (1) with "3", we get:

$$3m - 3n = 15 \ldots (3)$$

Adding equation (2) and equation (3), we get:

$$2m + 3n + 3m - 3n = 15 + 15$$

$$5m = 30$$

$$m = \frac{30}{5}$$

$$m = 6$$

Substituting the value of m in equation (1), we get:

$$n = 1$$

We have to find the value of $m + n$, so:

$$m + n = 6 + 1$$

$$m + n = 7$$

20. If $r^2 - 2rs + s^2 = 4$, then $(r - s)^6 = ?$ (PP)

Solution:

$$r^2 - 2rs + s^2 = 4$$

$$(r - s)^2 = 4$$

Taking cube on both sides of the equation, we get:

$$[(r - s)^2]^3 = [4]^3$$

$$(r - s)^{2 \times 3} = 4 \times 4 \times 4$$

$$(r - s)^6 = 64$$

21. If $2x - 5 = 98$, what is the value of $2x + 5$? (PP)

Solution:

$$2x - 5 = 98$$

Adding 10 on both sides of the equation, we get:

$$2x - 5 + 10 = 98 + 10$$

$$2x + 5 = 108$$

22. Simplify: (PP)

$$\sqrt{36y^2 + 64x^2}$$

Solution:

$$= \sqrt{36y^2 + 64x^2}$$

$$= \sqrt{4(9y^2 + 16x^2)}$$

$$= \sqrt{4} \times \sqrt{9y^2 + 16x^2}$$

$$= 2 \times \sqrt{9y^2 + 16x^2}$$

$$= 2\sqrt{9y^2 + 16x^2}$$

23. If $x + 5 = 8$, then $2x - 1 = ?$ (PP)

Solution:

$$x + 5 = 8$$
$$x = 8 - 5$$
$$x = 3$$

Substituting the value of x, we get:

$$= 2x - 1$$
$$= 2(3) - 1$$
$$= 6 - 1$$
$$= 5$$

24. If $x - y = 9$, then find: (PP)

$$\left(x - \frac{y}{3}\right) - \left(y - \frac{x}{3}\right)$$

Solution:

$$= \left(x - \frac{y}{3}\right) - \left(y - \frac{x}{3}\right)$$
$$= \left(\frac{3x - y}{3}\right) - \left(\frac{3y - x}{3}\right)$$
$$= \left(\frac{(3x - y) - (3y - x)}{3}\right)$$
$$= \left(\frac{3x - y - 3y + x}{3}\right)$$
$$= \left(\frac{4x - 4y}{3}\right)$$
$$= \left(\frac{4(x - y)}{3}\right)$$

Substituting the value of $x - y$, we get:

$$= \left(\frac{4(9)}{3}\right)$$

$$= 4 \times 3 = 12$$

25. If $7x + 10 = 44$, what is the value of $7x - 10$? (PP)

Solution:

$$7x + 10 = 44$$

Subtracting 20 from both sides of the equation, we get:

$$7x + 10 - 20 = 44 - 20$$

$$7x - 10 = 24$$

26. If $x + 2y = 2x + y$, then find the value of $x - y$? (PP)

Solution:

$$x + 2y = 2x + y$$

$$0 = 2x + y - x - 2y$$

$$0 = x - y$$

$$x - y = 0$$

27. Find the value of "b" if: (PP)

$$d = \frac{c - b}{a - b}$$

Solution:

$$d = \frac{c - b}{a - b}$$

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

$$ad - bd = c - b$$

$$b - bd = c - ad$$

$$b(1 - d) = c - ad$$

$$b = \frac{c - ad}{1 - d}$$

28. Find the value of x: (PP)

$$x + y = 8$$
$$2x - y = 10$$

Solution:

$$x + y = 8 \dots (1)$$
$$2x - y = 10 \dots (2)$$

Adding equation (1) and equation (2), we get:

$$x + 2x = 8 + 10$$
$$3x = 18$$
$$x = \frac{18}{3} = 6$$

29. Find the value of x: (PP)

$$(x - 2)(x + 4) - (x - 3)(x - 1) = 0$$

Solution:

$$(x^2 - 2x + 4x - 8) - (x^2 - 3x - x + 3) = 0$$
$$(x^2 + 2x - 8) - (x^2 - 4x + 3) = 0$$
$$x^2 + 2x - 8 - x^2 + 4x - 3 = 0$$
$$6x - 11 = 0$$
$$6x = 11$$
$$x = \frac{11}{6}$$

30. If x = 1, then find: (PP)

$$\left(2 - \frac{1}{2^{-x}}\right)\left(2 - \frac{1}{3^{-x}}\right)\left(2 - \frac{1}{4^{-x}}\right)$$

Solution:

$$= \left(2 - \frac{1}{2^{-x}}\right)\left(2 - \frac{1}{3^{-x}}\right)\left(2 - \frac{1}{4^{-x}}\right)$$
$$= (2 - 2^x)(2 - 3^x)(2 - 4^x)$$

Substituting the value of "x" in above equation, we get:

$$= (2 - 2^1)(2 - 3^1)(2 - 4^1)$$
$$= (2 - 2)(2 - 3)(2 - 4)$$
$$= (0)(-1)(-2)$$
$$= 0$$

31. Simplify: (PP)

$$\frac{\sqrt{32}c^3}{\sqrt{8}c}$$

Solution:

$$= \frac{\sqrt{4 \times 8} \times c^3}{\sqrt{8} \times c}$$
$$= \frac{\sqrt{4} \times \sqrt{8} \times c^3}{\sqrt{8} \times c}$$
$$= \frac{2 \times c^3}{c}$$
$$= 2c^2$$

32. If $x^2 + 2xy + y^2 = 25$, then find the value of $(x + y)^3$? (PP)

Solution:

$$x^2 + 2xy + y^2 = 25$$
$$(x + y)^2 = (5)^2$$
$$x + y = 5$$
$$(x + y)^3 = (5)^3$$
$$(x + y)^3 = 125$$

33. If $3x + 9 = 15$, then find the value of $x + 2$? (PP)

Solution:

$$3x + 9 = 15$$
$$3x = 15 - 9$$
$$3x = 6$$

$$x = \frac{6}{3} = 2$$

Solving for x+2, we get:

$$x + 2 = 2 + 2 = 4$$

34. Simplify: (PP)

$$\frac{1 + \frac{1}{x}}{\frac{y}{x}}$$

Solution:

$$= \frac{1 + \frac{1}{x}}{\frac{y}{x}}$$

$$= \frac{\frac{x+1}{x}}{\frac{y}{x}}$$

$$= \frac{(x+1) \times x}{y \times x}$$

$$= \frac{x+1}{y}$$

35. If $x - 3 = 3(1 - x)$, then find the value of x? (PP)

Solution:

$$x - 3 = 3(1 - x)$$
$$x - 3 = 3 - 3x$$
$$3x + x = 3 + 3$$
$$4x = 6$$
$$x = \frac{6}{4} = \frac{3}{2}$$
$$x = 1.5$$

36. If $x - 4 = 11$, then what is the value of $x - 8$? (PP)

Solution:

$$x - 4 = 11$$

Subtracting 4 from both sides of the equation, we get:

$$x - 4 - 4 = 11 - 4$$
$$x - 8 = 7$$

37. Find the value of M? (PP)

$$(86 - 28 + 39) - (800\% \ of \ 2) = M^2$$

Solution:

$$(86 - 28 + 39) - (800\% \ of \ 2) = M^2$$
$$(125 - 28) - \left(\frac{800}{100} \times 2\right) = M^2$$
$$(97) - (16) = M^2$$
$$81 = M^2$$
$$M = 9$$

38. If $4x + 2y - 3 = 0$ and $3x - 2y = 4$, then find the value of 'x'? (PP)

Solution:

$$4x + 2y - 3 = 0$$
$$4x + 2y = 3 \ldots (1)$$
$$3x - 2y = 4 \ldots (2)$$

Adding equation (1) and equation (2), we get:

$$4x + 3x = 7$$
$$7x = 7$$
$$x = \frac{7}{7}$$
$$x = 1$$

39. If $x + y = 6$ and $3x - y = 4$, then find the value of $x - y$? (PP)

Solution:

$$x + y = 6 \dots (1)$$

$$3x - y = 4 \dots (2)$$

Adding equation (1) and equation (2), we get:

$$x + 3x = 6 + 4$$

$$4x = 10$$

$$x = \frac{10}{4}$$

$$x = 2.5$$

Substituting the value of x in equation (1), we get:

$$2.5 + y = 6$$

$$y = 6 - 2.5$$

$$y = 3.5$$

We have to find the value of $x - y$, so:

$$x - y = 2.5 - 3.5$$

$$x - y = -1$$

40. What is the value of $2x^2 - 3x - 7$ when $x = -5$? (PP)

Solution:

$$= 2x^2 - 3x - 7$$

$$= 2(-5)^2 - 3(-5) - 7$$

$$= 2(25) + 15 - 7$$

$$= 50 + 15 - 7$$

$$= 65 - 7$$

$$= 58$$

41. If $x + y = 4$, $xy = 3$, then find the value of $x - y$? (PP)

Solution:

The value of x and y that follow the above two equations are 3 and 1, respectively. We can see that:

$$x + y = 3 + 1 = 4$$
$$xy = 3 \times 1 = 3$$

We have to find the value of $x - y$, so:

$$x - y = 3 - 1 = 2$$

42. What is the greatest value of x that is a solution of the following equation?

(PP)

$$|x - 5| + 10 = 15$$

(A)   0
(B)   5
(C)   10
(D)   20
(E)   30

Solution:

We will solve all five option one by one as follows:

Solving option (A):

Let $x = 0$ → $|0 - 5| + 10 = 15$
$$|-5| + 10 = 15$$
$$5 + 10 = 15$$
$$15 = 15 \ldots (Satisfied)$$

Solving option (B):

Let $x = 5$ → $|5 - 5| + 10 = 15$
$$|0| + 10 = 15$$
$$0 + 10 = 15$$
$$10 = 15 \ldots (Not\ satisfied)$$

Solving option (C):

Let $x = 10$ → $|10 - 5| + 10$
$$= 15$$
$$|5| + 10 = 15$$
$$5 + 10 = 15$$
$$15 = 15 \ldots (Satisfied)$$

Solving option (D):

Let $x = 20$ → $|20 - 5| + 10$
$$= 15$$
$$|15| + 10 = 15$$
$$15 + 10 = 15$$
$$25 = 15 \ldots (Not\ satisfied)$$

Solving option (E):

Let $x = 30 \rightarrow |30 - 5| + 10$

$= 15$

$|25| + 10 = 15$

$25 + 10 = 15$

$35 = 15 \dots (Not\ satisfied)$

As option (A) and option (C) both are satisfied but we have to choose maximum value of x so option (C) is correct.

43. If $x = 9$, then find the following: (PP)

$$(x)^2 + (x)^{\frac{1}{2}} + x$$

Solution:

Substituting the value of x in it, we get:

$$= (9)^2 + (9)^{\frac{1}{2}} + 9$$

$$= 81 + 3 + 9 = 93$$

44. If $x - \frac{1}{x} = 10$, find: (PP)

$$x^2 + \frac{1}{x^2}$$

Solution:

$$x - \frac{1}{x} = 10$$

Taking square on both sides, we get:

$$\left(x - \frac{1}{x}\right)^2 = (10)^2$$

$$(x)^2 + \left(\frac{1}{x}\right)^2 - 2(x)\left(\frac{1}{x}\right) = 100$$

$$x^2 + \frac{1}{x^2} - 2 = 100$$

$$x^2 + \frac{1}{x^2} = 100 + 2$$

$$x^2 + \frac{1}{x^2} = 102$$

45. If $x = 2y$, and $y = 4$, then find: (PP)

$$\frac{x^2 - y^2}{x^2 + y^2}$$

Solution:

We know that $y = 4$, substituting this value in $x = 2y$, we get

$$x = 2y = 2(4) = 8$$

Substituting the value of x and y, we get:

$$= \frac{8^2 - 4^2}{8^2 + 4^2}$$

$$= \frac{64 - 16}{64 + 16}$$

$$= \frac{48}{80} = \frac{3}{5}$$

46. Let $r \Delta s = rs + s$ for all integers r and s. What is the value of $4\Delta5$? (PP)

Solution:

We know that:

$$r\Delta s = rs + s$$

$$4\Delta5 = 4(5) + 5$$

$$4\Delta5 = 20 + 5 = 25$$

47. Which of the following expressions must be negative if $x < 0$? (PP)

   (A) $x^4 + x^2 + 4$

   (B) $x^5 - 1$

   (C) $x^6 - 1$

   (D) $x^6 + x^2 + 1$

   (E) $x^2 + 10$

Solution:

The trick for this kind of question is that the variable with odd power will give negative answer, hence option B is correct.

48. If $3y - 6 = 2 - y$, then find the value of $y^2 + 2y$? (PP)

Solution:

$$3y - 6 = 2 - y$$
$$3y + y = 2 + 6$$
$$4y = 8$$
$$y = 8/4 = 2$$

We have to find the value of $y^2 + 2y$, so:

$$= (2)^2 + 2(2)$$
$$= 4 + 4 = 8$$

49. Simplify: (PP)

$$\frac{(n)!}{(n-3)!}$$

Solution:

$$= \frac{(n)!}{(n-3)!}$$

$$= \frac{(n) \times (n-1) \times (n-2) \times (n-3)!}{(n-3)!}$$

$$= \frac{(n) \times (n-1) \times (n-2) \times 1}{1}$$

$$= (n)(n-1)(n-2)$$

50. Simplify: (PP)

$$\frac{(n-4)!}{(n-6)!}$$

Solution: