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Review exercise No. 7

3) Answer the following questions.

i) Define linear inequality in one variable

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A linear inequality in one variable is given by

$$ax + b < 0 \quad a \neq 0$$

or

$$ax + b > 0$$

ii) state trichotomy and transitive properties of inequalities

ثلاثی خاصیت ، خاصیت متعینیت

Trichotomy

If $a, b \in \mathbb{R}$
then $a < b$, $a > b$ or $a = b$

Transitive property

$a, b, c \in \mathbb{R}$
 $a < b$, and $b < c$, then $a < c$
or $a > b$ and $b > c \Rightarrow a > c$

$$\text{iii) } F = \frac{9}{5}C + 32$$

For what value of c is $F < 0$?

Sol:-

$$F < 0$$

$$\frac{9}{5}C + 32 < 0$$

$$\frac{9}{5}C < -32$$

$$C < -32 \times \frac{5}{9}$$

$$C < \frac{-160}{9} \quad \parallel$$

iv) Seven times of the sum of an integer and 12 is at least 50 and at most 60. write and solve the inequality that expresses ~~used~~ this relationship?

Sol: Let Integer = x
Given condition

$$50 \leq 7(x+12) \leq 60$$

$$\begin{array}{l}
 50 \leq 7(x+12) \quad , \quad 7(x+12) \leq 60 \\
 \frac{50}{7} \leq x+12 \\
 \frac{50}{7} - 12 \leq x \\
 \frac{50-84}{7} \leq x \\
 -\frac{34}{7} < x \\
 x+12 \leq \frac{60}{7} \\
 x \leq \frac{60}{7} - 12 \\
 x \leq \frac{60-84}{7} \\
 x \leq -\frac{24}{7}
 \end{array}$$

v) ①

$$\sqrt{2t+4} = \sqrt{t-1}$$

Squaring

$$(\sqrt{2t+4})^2 = (\sqrt{t-1})^2$$

$$2t+4 = t-1 \text{ --- (A)}$$

$$2t - t = -1 - 4$$

$$t = -5$$

put $t = -5$ in eq (A)

$$2(-5) + 4 = -5 - 1$$

$$-10 + 4 = -6$$

$$-6 = -6$$

$$\text{S.S } \{-5\}$$

\Rightarrow

4) ii)

$$\sqrt{3x-1} - 2\sqrt{8-2x} = 0$$

$$x = \frac{33}{11}$$

$$x = 3$$

check!

$$\begin{aligned} \sqrt{3(3)-1} &= 2\sqrt{8-2(3)} \\ \sqrt{8} &= 2\sqrt{2} \\ \sqrt{4 \times 2} &= 2\sqrt{2} \\ 2\sqrt{2} &= 2\sqrt{2} \\ \text{s.s } \{ 3 \} & \end{aligned}$$

$$\begin{aligned} \sqrt{3x-1} &= 2\sqrt{8-2x} \quad \text{--- (A)} \\ (\sqrt{3x-1})^2 &= (2\sqrt{8-2x})^2 \\ 3x-1 &= 4(8-2x) \\ 3x-1 &= 32-8x \\ 3x+8x &= 32+1 \\ 11x &= 33 \end{aligned}$$

5) ①

$$|3x + 14| - 2 = 5x$$

$$|3x + 14| = 5x + 2$$

$$3x + 14 = 5x + 2$$

$$3x - 5x = 2 - 14$$

$$-2x = -12$$

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

$$x = 6$$

$$x = 6 \text{ or } x = -2$$

$$-(3x + 14) = 5x + 2$$

$$-3x - 14 = 5x + 2$$

$$-3x - 5x = 2 + 14$$

$$-8x = 16$$

$$x = \frac{16}{-8}$$

$$x = -2$$

$$(5) \text{ ii) } \frac{1}{3} |x-3| = \frac{1}{2} |x+2|$$

$$\frac{|x-3|}{|x+2|} = \frac{1}{2} \times \frac{3}{1}$$

$$\left| \frac{x-3}{x+2} \right| = \frac{3}{2}$$

$$\frac{x-3}{x+2} = \frac{3}{2}, \quad - \left(\frac{x-3}{x+2} \right) = \frac{3}{2}$$

$$2x-6 = 3x+6$$

$$2x-3x = 6+6$$

$$-x = 12 \Rightarrow \boxed{x = -12}$$

$$\frac{x-3}{x+2} = \frac{-3}{2}$$

$$2x-6 = -3x-6$$

$$2x+3x = -6+6$$

$$5x = 0$$

$$x = \frac{0}{5}$$

$$\boxed{x = 0}$$

$$\boxed{x = -12 \text{ or } x = 0}$$

6) Solve the following inequality

$$i) \quad -\frac{1}{3}x + 5 \leq 1$$

$$-\frac{1}{3}x \leq 1 - 5$$

$$-\frac{1}{3}x \leq -4$$

$$\frac{1}{3}x \geq 4$$

$$x \geq 4 \times 3$$

$$x \geq 12$$

$$\text{ii) } -3 < \frac{1-2x}{5} < 1$$

$$-3 < \frac{1-2x}{5}$$

,

$$\frac{1-2x}{5} < 1$$

$$-15 < 1-2x$$

$$1-2x < 1 \times 5$$

$$-15-1 < -2x$$

$$1-2x < 5$$

$$-16 < -2x$$

$$-2x < 5-1$$

$$\frac{-16}{2}$$

$$> x$$

$$-2x < 4$$

$$x > \frac{4}{-2}$$

$$8 > x$$

$$x > -2$$

$$\boxed{-2 < x < 8}$$