Linear Inequalities Ex. 4.12 p. 98

1) $1 - 2x > x - 2$

$-2x - x > -2 - 1$

$\frac{-3x}{-3} > \frac{-3}{-3}$

$x < 1$

$x \in \mathbb{R}\ (-\infty; 1)$

2) $\frac{y+3}{2} + 5 > 8$

$\frac{y+3}{2} > 3$

$y + 3 > 3(2)$

$y + 3 > 6$

$y > 3$

$y \in \mathbb{R};\ (3; \infty)$

LCD: 6

3) $\frac{x}{5} - 1 \leq 2 - \frac{x}{10}$

LCD: 10

$2x - 10 \leq 20 - x$

$2x + x \leq 20 + 10$

$3x \leq 30$

$x \leq 10$

$x \in \mathbb{R}\ (-\infty; 10]$

4) $m + \frac{m}{3} < 11 - \frac{m}{2}$

$6m + 2m < 66 - 3m$

$11m < 66$

$m < 6$

$m \in \mathbb{R};\ (-\infty; 6)$

5) $\frac{3(x-2)}{2} - \frac{7(x-3)}{4} \geq 3$ LCD: 4

$2 \times 3(x-2) - 7(x-3) \geq 12$

$6x - 12 - 7x + 21 \geq 12$

$-x \geq 24 - 21$

$-x \geq 3$

$x \leq -3$ $x \in \mathbb{R};\ (-\infty; -3]$

9) $x - \frac{5}{2} \geq 3x + 3(x+5)$

$x - \frac{5}{2} \geq 3x + 3x + 15$

$x - \frac{5}{2} \geq 6x + 15$ LCD: 2

$2x - 5 \geq 12x + 30$

$2x - 12x \geq 30 + 5$

$\frac{-10x}{-10} \geq \frac{35}{-10}$

$x \leq -3,5 \;/ -\frac{7}{2}$

$x \in \mathbb{R}; (-\infty; -\frac{7}{2}]$

10) $-1 \leq x - 3 < 5$

$-1 + 3 \leq x < 5 + 3$

$2 \leq x < 8$

$x \in \mathbb{R}; [2; 8)$

11) $-1 \leq 2x - 5 \leq 5$

$-1 + 5 \leq 2x \leq 5 + 5$

$\frac{4}{2} \leq \frac{2x}{2} \leq \frac{10}{2}$

$2 \leq x \leq 5$

$x \in \mathbb{R}, [2; 5]$

12) $-1 \leq 2 + \frac{m}{3} < 4$

$-1 - 2 \leq \frac{m}{3} < 4 - 2$

LCD: 3

$-3 \leq \frac{m}{3} < 2$

$-9 \leq m < 6$

$m \in \mathbb{R}, [-9; 6)$

Ex. 4.13 p. 99

6) a) $5x+7 \geq 29-6x$

$5x+6x \geq 29-7$

$11x \geq 22$

$x \geq 2$

$x \in \mathbb{R}; [2; \infty)$

b) $7x-6 < 4x+3$

$7x-4x < 3+6$

$3x < 9$

$x < 3$

$x \in \mathbb{R}; (-\infty; 3)$

c) $-2(x+3) > 5x-76$

$-2x-6 > 5x-76$

$-6+76 > 5x+2x$

$70 > 7x$

$10 > x$

$x < 10$

$x \in \mathbb{R}; (-\infty; 10)$

d) $5(x-3) \leq 2(2x-7)$

$5x-15 \leq 4x-14$

$5x-4x \leq -14+15$

$x \leq 1$

$x \in \mathbb{R}; (-\infty; 1]$

e) $\frac{3x-1}{4} + \frac{3x-3}{8} \geq \frac{19}{8}$

LCD: 8

$2(3x-1)+3x-3 \geq 19$

$6x-2+3x-3 \geq 19$

$9x \geq 19+3+2$

$9x \geq 24$

$x \geq \frac{24}{9}$

$x \geq \frac{8}{3}$

$x \in \mathbb{R}; [\frac{8}{3}; \infty)$

f) $x - \frac{x-2}{3} \geq \frac{3}{2} - \frac{7}{8}$

$24x - 8(x-2) \geq 12(3) - 3(7$

$24x-8x+16 \geq 36-21$

LCD 24

$16x \geq -1$

$x \geq \frac{-1}{16}$

$x \in \mathbb{R}; [\frac{-1}{16}; \infty)$

g) $-4 \leq \frac{3x-2}{2} \leq 8$

LCD: 2

$-4(2) \leq 3x-2 \leq 8(2)$

$-8 \leq 3x-2 \leq 16$

$-8+2 \leq 3x \leq 16+2$

$\frac{-6}{3} \leq \frac{3x}{3} \leq \frac{18}{3}$

$-2 \leq x \leq 6$

$x \in \mathbb{R}; [-2, 6]$

h) $-2 \leq \frac{2-2x}{4} \leq 3$ LCD: 4

$-2(4) \leq 2-2x \leq 3(4)$

$-8 \leq 2-2x \leq 12$

$-8-2 \leq -2x \leq 12-2$

$\frac{-10}{-2} \leq \frac{-2x}{-2} \leq \frac{10}{-2}$

$5 \geq x \geq -5$

$-5 \leq x \leq 5$

$x \in \mathbb{R}; [-5, 5]$