

Nama : Patra Rafles Wostyla Sinaga

NIM : 231402052

Tugas : Problem Set 1.2 No. 3 – 26 dan No. 35 – 44

Problem Set 1.3 No. 15 – 40

$$3) x - 7 < 2x - 5$$

$$\Rightarrow -x < 2$$

$$x > -2 \Rightarrow (-2, \infty)$$

$$4) 3x - 5 < 4x - 6$$

$$\Rightarrow -x < -1$$

$$x > 1 \Rightarrow (1, \infty)$$

$$5) 7x - 2 \leq 9x + 3$$

$$\Rightarrow -2x \leq 5$$

$$x \geq -\frac{5}{2} \left[-\frac{5}{2}, \infty\right)$$

$$6) 5x - 3 > 6x - 4$$

$$\Rightarrow -x > -1$$

$$x < 1 \quad (-\infty, 1)$$

$$7) -9 < 3x + 2 < 5$$

$$-6 < 3x < 3 \Rightarrow -2 < x < 1 \quad (-2, 1)$$

$$8) -3 < 4x - 9 < 11$$

$$\frac{3}{2} < x < 5 \quad \left(\frac{3}{2}, 5\right)$$

$$9) -3 < 1 - 6x \leq 4$$

$$\frac{2}{3} > x \geq -\frac{1}{2} \Rightarrow -\frac{1}{2} \leq x < \frac{2}{3} \quad \left[-\frac{1}{2}, \frac{2}{3}\right)$$

$$10) 4 < 5 - 3x < 7$$

$$-\frac{2}{3} < x < \frac{1}{3} \Rightarrow \left(-\frac{2}{3}, \frac{1}{3}\right)$$

11  $x^2 + 2x - 12 < 0$   
 $\Rightarrow x_1 = \frac{-2 + \sqrt{4+48}}{2} \Rightarrow x_1 = \frac{-2 + 2\sqrt{13}}{2}$   
 $\Rightarrow x_1 = -1 + \sqrt{13}$

$x_2 = -1 - \sqrt{13}$

$(x + 1 - \sqrt{13})(x + 1 + \sqrt{13}) < 0$

$x=0$

$(-4 - \sqrt{13})(1 + \sqrt{13}) < 0$

$1 - \sqrt{13} < 0$

$\Rightarrow -1 - \sqrt{13} < x < -1 + \sqrt{13}$

$(-1 - \sqrt{13}, -1 + \sqrt{13})$

12  $x^2 - 5x - 6 > 0$   
 $\Rightarrow (x-6)(x+1) > 0$

$\therefore x=0$

$-6 > 0 \text{ (TM)}$

$\therefore x = -2$

$(-8)(-1) > 0 \Rightarrow 8 > 0$

$\therefore x = ?$

$(1)(8) > 0$

$\Rightarrow x < -1 \vee x > 6$

$(-6, -1) \vee (6, \infty)$

13  $2x^2 + 5x - 3 > 0$

$\Rightarrow (2x-1)(x+3) > 0$

$\xleftarrow{-\frac{1}{2}} \quad \xrightarrow{\frac{1}{2}}$

$x < -3 \vee x > \frac{1}{2}$

$\therefore x=0 \Rightarrow (-1)(3) > 0 \text{ (TM)}$

$\Rightarrow (-6, -3) \cup (\frac{1}{2}, \infty)$

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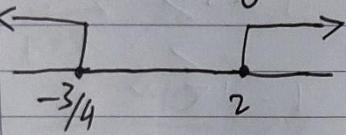
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$$(14) \quad 4x^2 - 5x - 6 > 0$$

$$\Rightarrow x_1 = \frac{5 + \sqrt{25 + 96}}{8} \Rightarrow x_1 = \frac{5 + \sqrt{121}}{8}$$

$$\Rightarrow x_1 = 2$$

$$\Rightarrow x_2 = \frac{-6}{8} \Rightarrow x_2 = -\frac{3}{4}$$

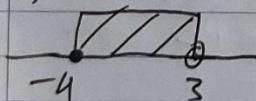


$$\begin{aligned} &\therefore x = 0 \\ &(x-2)(x+\frac{3}{4}) > 0 \\ &(-2)(\frac{3}{4}) > 0 \quad (\text{TM}) \end{aligned}$$

$$x < -\frac{3}{4} \vee x > 2$$

$$(-\infty, -\frac{3}{4}) \cup (2, \infty)$$

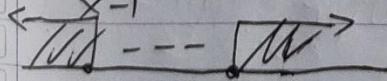
$$(15) \quad \frac{x+4}{x-3} < 0$$



$$\therefore x = 0 \Rightarrow \frac{4}{-3} \leq 0$$

$$-4 < x < 3 \Rightarrow [-4, 3)$$

$$(16) \quad \frac{3x-2}{x-1} > 0$$



$$\therefore x = 2$$

$$4 > 0$$

$$\begin{aligned} &x < \frac{2}{3} \vee x > 1 \\ &(-\infty, \frac{2}{3}) \cup (1, \infty) \end{aligned}$$

$$17 \frac{2}{x} < 5 \Rightarrow \frac{x}{2} > \frac{1}{5}$$

$$x > \frac{2}{5} \quad \cup \quad (-\infty, 0)$$

$$\left( \frac{2}{5}, \infty \right) \quad \cup \quad (-\infty, 0)$$

$$18 \frac{7}{4x} \leq 7$$

$$x \geq \frac{1}{4} \quad \cup \quad x < 0$$

$$\left[ \frac{1}{4}, \infty \right) \quad \cup \quad (-\infty, 0)$$

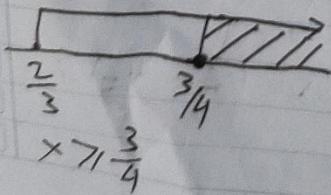
$$19 \frac{1}{3x-2} \leq 4$$

$$\frac{1-12x+8}{3x-2} \leq 0$$

$$\frac{-12x+9}{3x-2} \leq 0$$

$$\frac{-12x+9}{3x-2} \leq 0 \Rightarrow x \geq \frac{9}{12} \Rightarrow x \geq \frac{3}{4}$$

$$\begin{aligned} -12x+9 &\geq 0 \Rightarrow x \leq \frac{3}{4} \\ 3x-2 &< 0 \Rightarrow x < \frac{2}{3} \end{aligned}$$



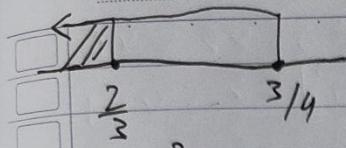
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$$x < \frac{2}{3} \cup x \geq \frac{3}{4}$$

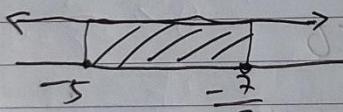
$$(-\infty, \frac{2}{3}) \cup [\frac{3}{4}, \infty).$$

$$\text{so } \frac{3}{x+5} > 0$$

$$\frac{3-2x-10}{x+5} > 0$$

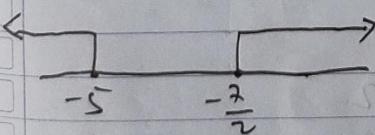
$$\frac{-2x-7}{x+5} > 0$$

$$\begin{aligned} \therefore -2x-7 > 0 &\Rightarrow x < -\frac{7}{2} \\ x+5 > 0 &\Rightarrow x > -5 \end{aligned}$$



$$-5 < x < -\frac{7}{2}$$

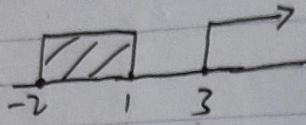
$$\begin{aligned} \therefore -2x-7 < 0 &\Rightarrow x > -\frac{7}{2} \\ x+5 < 0 &\Rightarrow x < -5 \end{aligned}$$



$$\text{Penyelesaian: } -5 < x < -\frac{7}{2} \Rightarrow (-5, -\frac{7}{2}).$$



$$21 \quad (x+2)(x-1)(x-3) > 0$$



•)  $x = -3$   
 $(-)(-)(-) > 0$  (TM)

•)  $x = 0$

•)  $x = 2$

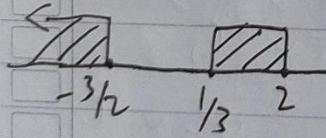
•)  $x = 4$

•)  $x = 0$

$$-2 < x < 1 \quad \cup \quad x > 3$$

$$(-2, 1) \quad \cup \quad (3, \infty)$$

$$22 \quad (2x+3)(3x-1)(x-2) < 0$$



•)  $x = -2$

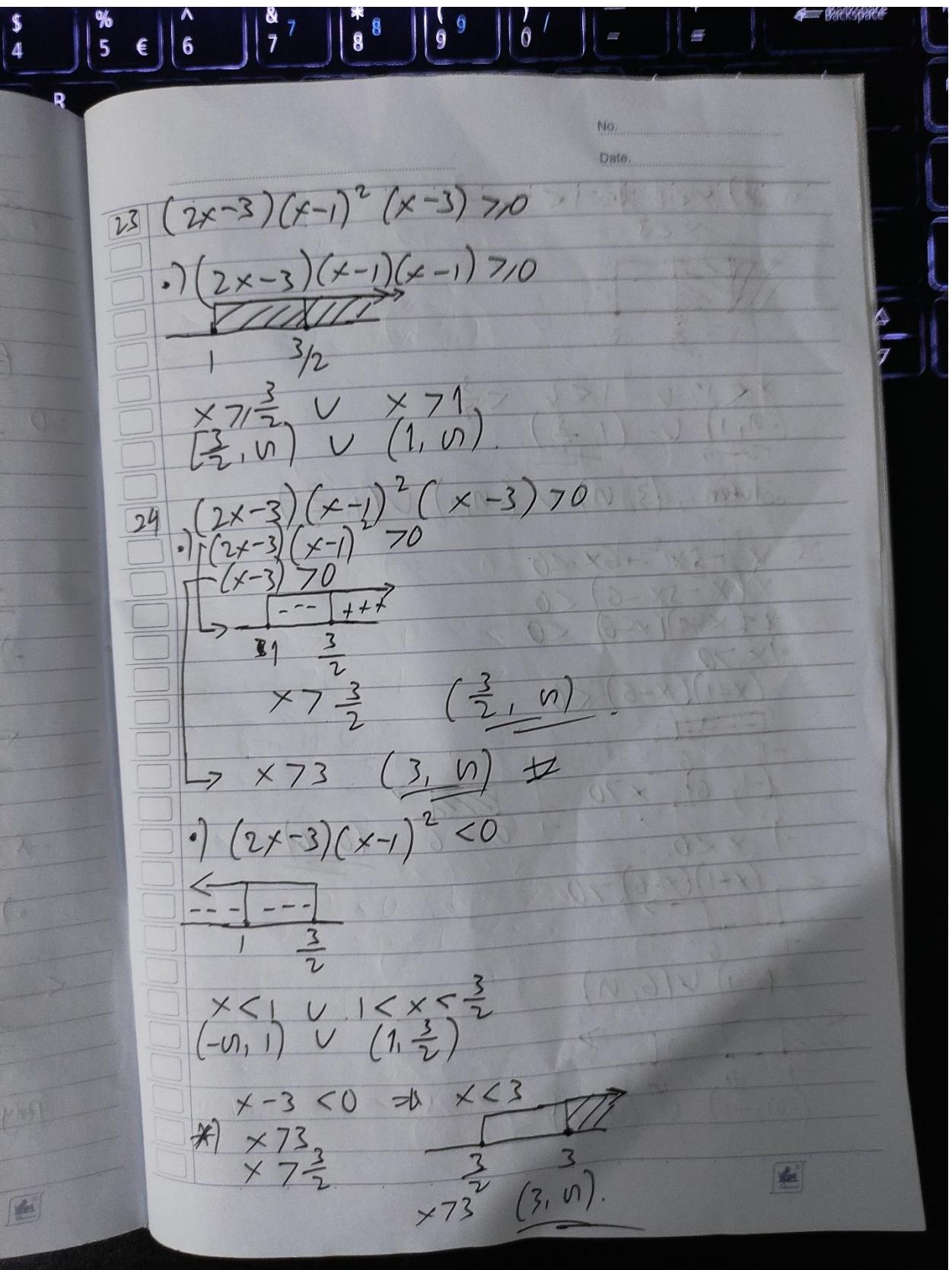
•)  $(-)(-)(-) < 0$

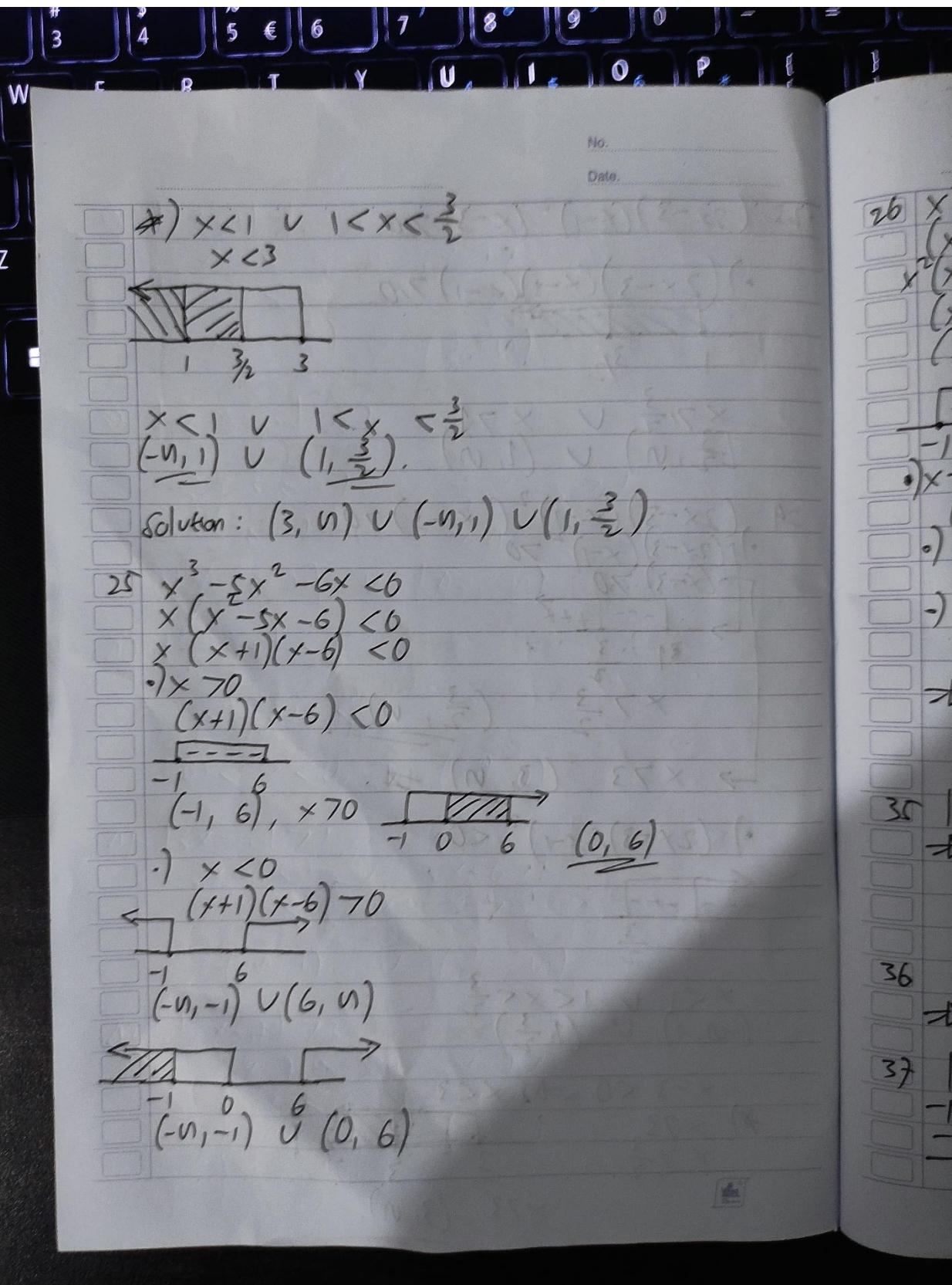
•)  $x = \frac{1}{3}$

•)  $(+)(+)(-) < 0$

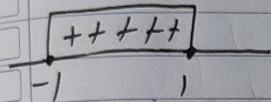
$$x < -\frac{3}{2} \quad \cup \quad \frac{1}{3} < x < 2$$

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





$$\begin{aligned}
 26 \quad & x^3 - x^2 - x + 1 > 0 \\
 & (x^3 - x^2) - (x - 1) > 0 \\
 & x^2(x - 1) - (x - 1) > 0 \\
 & (x - 1)(x^2 - 1) > 0 \\
 & (x - 1)(x - 1)(x + 1) > 0
 \end{aligned}$$



•  $x = 0$

$$(-)(-)(+) > 0$$

•  $x = 2$

$$(+)(+)(+) > 0$$

•  $x = -2$

$$(-)(-)(-) < 0$$

$$\Rightarrow -1 < x < 1 \cup x > 1$$

$$(-1, 1) \cup (1, \infty)$$

35  $|x - 2| \geq 5$

$$\Rightarrow x - 2 \leq -5 \cup x - 2 \geq 5$$

$$x \leq -3 \cup x \geq 7$$

$$[-\infty, -3] \cup [7, \infty)$$

36  $|x + 2| < 1$

$$\Rightarrow -1 < x + 2 < 1 \Rightarrow -3 < x < -1 \Rightarrow (-3, -1)$$

37  $|4x + 5| \leq 10$

$$-10 \leq 4x + 5 \leq 10$$

$$\frac{-15}{4} \leq x \leq \frac{5}{4} \Rightarrow \left[ -\frac{15}{4}, \frac{5}{4} \right]$$

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38  $|2x-1| > 2$   
 $2x-1 < -2 \vee 2x-1 > 2$   
 $x < -\frac{1}{2} \vee x > \frac{3}{2}$   
 $(-\infty, -\frac{1}{2}) \cup (\frac{3}{2}, \infty)$ .

39  $|\frac{2}{7}x - 5| \geq 7$   
 $\frac{2}{7}x - 5 \leq -7 \vee \frac{2}{7}x - 5 \geq 7$   
 $x \leq -7 \vee x \geq 42$ .  
 $(-\infty, -7] \cup [42, \infty)$

40  $|\frac{x}{4} + 1| < 1$   
 $-1 < \frac{x}{4} + 1 < 1$   
 $-8 < x < 0 \Rightarrow (-8, 0)$

41  $|5x-6| > 1$   
 $5x-6 < -1 \vee 5x-6 > 1$   
 $x < \frac{5}{5} \vee x > \frac{7}{5}$   
 $(-\infty, 1) \cup (\frac{7}{5}, \infty)$

42  $|2x-7| \geq 3$   
 $\Rightarrow 2x-7 < -3 \vee 2x-7 \geq 3$   
 $x < 2 \vee x \geq 5$   
 $(-\infty, 2) \cup (5, \infty)$ .

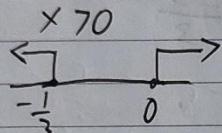
43  $\frac{1}{x}$

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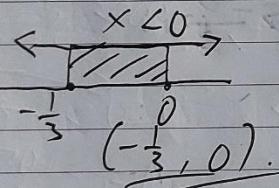
$$43 \quad | \frac{1}{x} - 3 | > 6$$

$$\Rightarrow \bullet) \frac{1}{x} - 3 > 6 \quad \bullet) \frac{1+3x}{x} < 0.$$

$$\bullet) 1+3x < 0 \Rightarrow x < -\frac{1}{3}.$$



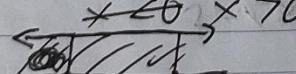
$$\bullet) 1+3x > 0 \Rightarrow x > -\frac{1}{3}.$$



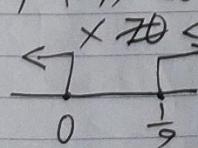
$$\bullet) \frac{1}{x} - 3 > 6$$

$$\frac{1-9x}{x} > 0$$

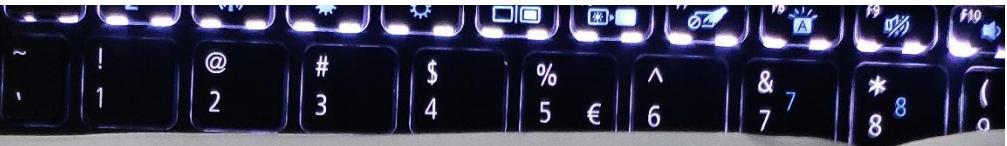
$$\bullet) 1-9x > 0 \Rightarrow x < \frac{1}{9}$$



$$\bullet) 1-9x < 0 \Rightarrow x > \frac{1}{9}$$



$$\Rightarrow (-\frac{1}{3}, 0) \cup (0, \frac{1}{9})$$



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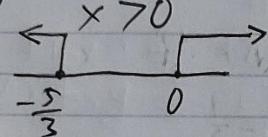
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$$99 \mid 2 + \frac{5}{x} \mid 71$$

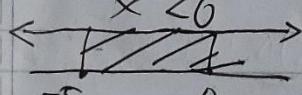
$$*) 2 + \frac{5}{x} < -1$$

$$\frac{5+3x}{x} < 0$$

$$\bullet) 5+3x < 0 \Rightarrow x < -\frac{5}{3}$$



$$\bullet) 5+3x > 0 \Rightarrow x > -\frac{5}{3}$$

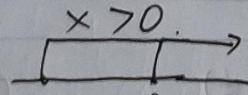


$$\Rightarrow (-\frac{5}{3}, 0)$$

$$**) 2 + \frac{5}{x} > 1$$

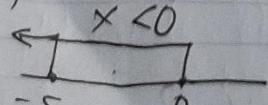
$$\frac{5+x}{x} > 0$$

$$\bullet) 5+x > 0 \Rightarrow x > -5$$



$$\Rightarrow (0, \infty)$$

$$\bullet) 5+x < 0 \Rightarrow x < -5$$



$$\Rightarrow (-\infty, -5)$$

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$\Rightarrow (-n, -5) \cup \cancel{(-\frac{5}{3}, 0)} \cup (0, n)$

Problem Set 1.3

In problems 15-16, find the equation of the circle satisfying the given conditions.

15 Diameter AB, where  $A = (1, 3)$  and  $B = (3, 7)$

Ans:

$M = (2, 5)$ .

$r(A, B) = \sqrt{\frac{9+16}{2}} \Rightarrow r(A, B) = \sqrt{5}$

$(x-h)^2 + (y-k)^2 = r^2$

$\Rightarrow (x-2)^2 + (y-5)^2 = 5$ .

16 Center  $(3, 4)$  and tangent to  $x$ -axis

Ans:

$(x-3)^2 + (y-4)^2 = 16$

In problems 17-22, find the center and radius of the circle with the given equation.

18  $x^2 + y^2 - 6y = 16$

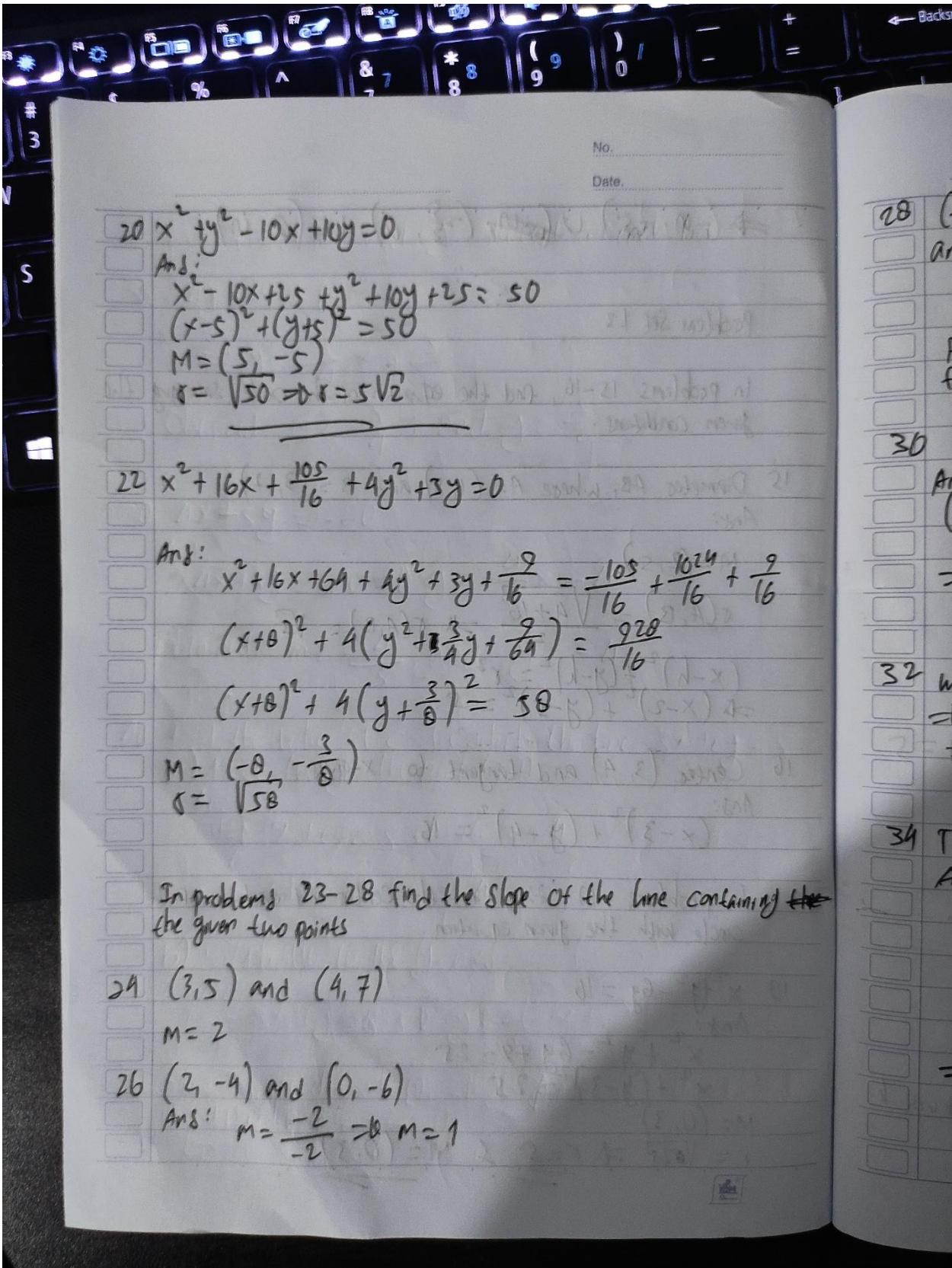
Ans:

$x^2 + y^2 - 6y + 9 = 25$

$x^2 + (y-3)^2 = 25$

$M = (0, 3)$

$r = \sqrt{25} \Rightarrow r = 5 \text{ & } M = (0, 3)$



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28 (-6, 0) and (0, 6)

$$\text{Ans: } m = \frac{6}{6} \Rightarrow m = 1$$

Find the equation for each line. Then write your answer in the form  $AX+BY+C=0$ .

30 Through (3, 4), with slope -1

Ans:

$$(y-y_1) = m(x-x_1) \Rightarrow y-4 = -x+3$$

$$\Rightarrow x+y-7=0$$

9  
16

32 with y-intercept 5, and slope 0

$$\Rightarrow y = mx+c$$

$$\Rightarrow y = 5 \Rightarrow y-5 = 0$$

34 Through (9, 1), and (8, 2)

Ans:

$$m = \frac{1}{9}$$

$$y-1 = \frac{1}{9}(x-9) \Rightarrow 9y-9 = x-9$$

$$\Rightarrow x-9y = 0$$

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Find the slope and y-intercept of each line.

36  $-4y = 5x - 6$

Ans:  $\Rightarrow y = -\frac{5}{4}x + \frac{3}{2}$

Obtained:  $m = -\frac{5}{4}$ ; and  $y = \frac{3}{2}$ .

38  $4x + 5y = -20$

Ans:  $4x + 5y = -20 \Rightarrow y = -\frac{4}{5}x - 4$

Obtained:  $m = -\frac{4}{5}$ ; and  $y = -4$ .

40 Find the value of  $c$  for which the line  $3x + cy = 5$ .

a) Passes through the point  $(3, 1)$

Ans:  $\Rightarrow 9 + c = 5 \Rightarrow c = -4$

Obtained  $c = -4$

b) is parallel to the  $y$ -axis

Ans:  $3x + cy = 5 \Rightarrow y = -\frac{3}{c}x + \frac{5}{c}$

Garis sejajar dg  $y$ , shg nilai  $y = 0$ , untuk itu diperoleh nilai  $c = 0$ .

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c) parallel to the line  $2x + 3y = 6$

And:  $y = -\frac{2}{3}x + 2$

$M_1 = M_2 = -\frac{2}{3}$ .

$y = -\frac{3}{C}x + \frac{5}{C}$

$\Rightarrow -\frac{3}{C} = -\frac{2}{3} \Rightarrow C = \underline{\underline{\frac{9}{2}}}.$

d) has equal x-and y-intercepts.

Ans:  $3x + Cy = 5$

$\Rightarrow y = 0$

$\Rightarrow 3x = 5 \Rightarrow x = \underline{\underline{\frac{5}{3}}}$

~~$x = y = \frac{5}{3}$~~

$\Rightarrow x = 0$

$\Rightarrow Cy = 5 \Rightarrow y = \frac{5}{C} \cdot \frac{8}{3} = \underline{\underline{\frac{5}{C}}} \Rightarrow C = \underline{\underline{3}}$

Obtained  $C = \underline{\underline{3}}$

e) is perpendicular to the line  $y - 2 = 3(x + 3)$

And:

$3x + Cy = 5 \Rightarrow y = -\frac{3}{C}x + \frac{5}{C}$

$y - 2 = 3(x + 3)$

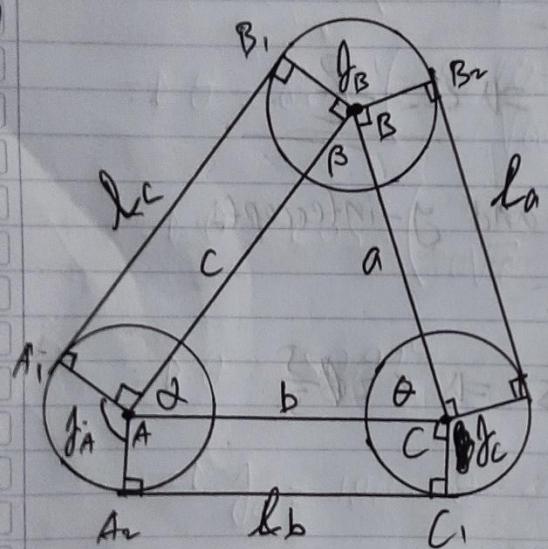
$\Rightarrow M_2 = 3$ .

$\Rightarrow M_1 = -\frac{1}{M_2} \Rightarrow M_1 = -\frac{1}{3}$ .

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$$= \lambda = \frac{3}{C} = -\frac{1}{3} \Rightarrow C = \underline{\underline{9}}$$

Obtained  $C = \underline{\underline{9}}$ .



A belt fits around the three circles  $x^2 + y^2 = 9$ ,  $(x-8)^2 + y^2 = 9$ , and  $(x-6)^2 + (y-8)^2 = 9$ , as shown above. Find the length of this belt.

Ans.:  $l = l_a + l_b + l_c + \widehat{A_1 A_2} + \widehat{B_1 B_2} + \widehat{C_1 C_2}$

$$A(0, 0); B(6, 8); C(8, 0)$$

$$l_a = a = \sqrt{64+64} \Rightarrow l_a = a = \sqrt{68} \approx 8.25$$

$$l_b = b = \sqrt{36+64} \Rightarrow l_b = b = 10$$

$$l_c = c = \sqrt{64} \Rightarrow l_c = c = 8$$

$$A^2 = b^2 + c^2 - 2bc \cdot \cos \alpha$$

$$2bc \cdot \cos \alpha = b^2 + c^2 - A^2$$

$$\Rightarrow \cos \alpha = \frac{b^2 + c^2 - A^2}{2bc} \Rightarrow \alpha = \cos^{-1} \left( \frac{(100+64-68)}{160} \right)$$

$$\Rightarrow \alpha = \cos^{-1} \left( \frac{96}{160} \right) \Rightarrow \alpha = 53,1^\circ$$

$$\Rightarrow \gamma_A + 90 + \alpha + 90 = 360$$

$$\Rightarrow \gamma_A = 180 - 53,1 \Rightarrow \gamma_A = 126,9^\circ$$

$$\Rightarrow \gamma_A = 126,9 \cdot \frac{\pi}{180} \text{ rad} \Rightarrow \gamma_A = 2,215 \text{ rad.}$$

$$\circ) \overline{A_1 A_2} = r \cdot \gamma_A \Rightarrow \overline{A_1 A_2} = 1,93 \text{ satvan}$$

$$** b^2 = a^2 + c^2 - 2ac \cdot \cos \beta$$

$$\cos \beta = \frac{68+64-100}{16 \cdot \sqrt{68}} \Rightarrow \beta = \cos^{-1} \left( \frac{32^2}{16 \sqrt{68}} \right)$$

$$\Rightarrow \beta = 75,96^\circ$$

$$\beta = 75,96 \cdot \frac{\pi}{180} \text{ rad} \Rightarrow \beta = 1,336 \text{ rad}$$

$$\gamma_B + 90 + \beta + 90 = 360 \Rightarrow \gamma_B = 180 - 75,96$$

$$\Rightarrow \gamma_B = 104,04 \Rightarrow \gamma_B \approx 104^\circ$$

$$\Rightarrow \gamma_B = 104 \cdot \frac{\pi}{180} \text{ rad} \Rightarrow \gamma_B = 1,815 \text{ rad}$$

$$= 9, (x+0)^2 \\ \text{own } \rightarrow \text{above.}$$

$$+ \widehat{C_1 C_2}$$

$$\vec{r}_B \approx 8,25$$

$$\bullet \widehat{B_1 B_2} = r \cdot j_B \Rightarrow \widehat{B_1 B_2} = 3,63 \text{ satuan}$$

$$c^2 = a^2 + b^2 - 2ab \cdot \cos \theta \\ \Rightarrow \theta = \cos^{-1} \left( \frac{a^2 + b^2 - c^2}{2ab} \right)$$

$$\Rightarrow \theta = \cos^{-1} \left( \frac{68 + 100 - 64}{20\sqrt{68}} \right)$$

$$\Rightarrow \theta = \cos^{-1} \left( \frac{104}{20\sqrt{68}} \right)$$

$$\Rightarrow \theta = 50,91^\circ$$

$$\Rightarrow j_c = 180 - \theta \Rightarrow j_c = 129,09^\circ$$

$$\Rightarrow j_c = 129,09 \cdot \frac{\pi}{180} \text{ rad} \Rightarrow j_c = 2,253 \text{ rad}$$

$$\bullet \widehat{C_1 C_2} = r \cdot j_c \Rightarrow \widehat{C_1 C_2} = 4,51 \text{ satuan}$$

$$\Rightarrow l = l_a + l_b + l_c + \widehat{A_1 A_2} + \widehat{B_1 B_2} + \widehat{C_1 C_2}$$

$$l = 8,25 + 10 + 8 + 4,43 + 3,63 + 4,51$$

$$l = 38,82 \text{ satuan}$$