Arbeidshefte

Ulikheter

Løsningsforslag

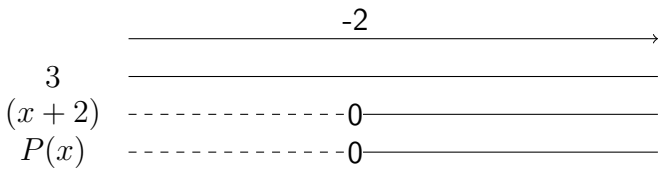
Oppgave 1

1) løst algebraisk

$$\begin{aligned} 5x + 4 &> 2x - 2 \\ 5x - 2x &> -2 - 4 \\ 3x &> -6 \\ x &> -2 \end{aligned}$$

1) løst med fortegnslinje

$$\begin{aligned} 5x + 4 &> 2x - 2 \\ 5x - 2x + 4 + 2 &> 0 \\ 3x + 6 &> 0 \\ 3(x + 2) &> 0 \end{aligned}$$



2)

$$\begin{aligned} 3(2x + 1) - (5 - x) &> 1 - x - 3 \\ 6x + 3 - 5 + x &> -x - 2 \\ 7x - 2 + x + 2 &> 0 \\ 8x &> 0 \\ x &> 0 \end{aligned}$$

3)

$$\begin{aligned} 3x - 5 &< 5 \\ 3x &< 5 + 5 \\ 5x &< 10 \\ x &< \frac{10}{3} \end{aligned}$$

Oppgave 2

1)

$$\begin{aligned}\frac{2}{3}x - 2 &\leq -3\\ 2x - 6 &\leq -9\\ 2x &\leq -3\\ x &\leq -\frac{3}{2}\end{aligned}$$

2)

$$\begin{aligned}5x - 3 &< 2x - 6\\ 5x - 2x &< -6 + 3\\ 3x &< -3\\ x &< -1\end{aligned}$$

3)

$$\begin{aligned}\frac{x}{2} - \frac{x}{3} &> \frac{1}{6}\\ 3x - 2x &> 1\\ 3x &> 3\\ x &> 1\\ x &\in \langle 1, \rightarrow \rangle\end{aligned}$$

Oppgave 3

1)

$$\begin{aligned} 3(2-x) &< 3-x \\ 6-3x+x &< 3 \\ -2x &< -3 \\ x &> \frac{3}{2} \end{aligned}$$

2)

$$\begin{aligned} 3(1-x) &< 2(x-1) \\ 3-3x &< 2x-2 \\ -3x-2x &< -2-3 \\ -5x &< -5 \\ x &> 1 \end{aligned}$$

3)

$$\begin{aligned} 1-x &\geq 1+x \\ -x-x &\geq 1-1 \\ -2x &\geq 0 \\ x &\leq 0 \end{aligned}$$

Oppgave 4

1)

$$\begin{aligned}
\frac{x+4}{3} &< \frac{2x+1}{3} + 1 \\
x+4 &< 2x+1+3 \\
x-2x &< 4-4 \\
-x &< 0 \\
x &> 0
\end{aligned}$$

2)

$$\begin{aligned}
\frac{5}{2} + \frac{x}{3} - \frac{7}{4} &\geq 3 - \frac{x}{6} \\
30 + 4x - 21 &\geq 36 - 2x \\
4x + 2x &\geq 36 - 9 \\
6x &\geq 27 \\
x &\geq \frac{9}{2}
\end{aligned}$$

3)

$$\begin{aligned}
\frac{7x+4}{4} &< 2 - \frac{x-3}{2} + \frac{3x}{8} \\
2(7x+4) &< 16 - 4(x-3) + 3x \\
14x + 8 &< 16 - 4x + 12 + 3x \\
14x + x &< 28 - 8 \\
15x &< 20 \\
x &< \frac{4}{3}
\end{aligned}$$

Oppgave 5

1)

$$\begin{aligned}
\frac{1}{2}(x-2) - \frac{1}{3}(x-2) &< \frac{5}{6} \\
3(x-2) - 2(x-2) &< 5 \\
3x - 6 - 2x + 4 &< 5 \\
x &< 5 + 2 \\
x &< 7
\end{aligned}$$

2)

$$\begin{aligned}
2(x - \frac{1}{4}) + \frac{x}{3} &< \frac{x}{2} - \frac{7}{3} \\
12(x - \frac{1}{4}) + 2x &< 3x - 14 \\
12x - 3 + 2x &< 3x - 14 \\
14x - 3x &< -14 + 3 \\
11x &< -11 \\
x &< -1
\end{aligned}$$

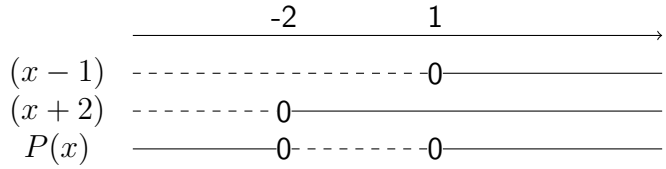
3)

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

Oppgave 6

1)

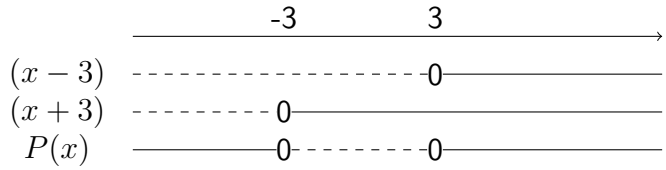
$$\begin{aligned} x^2 + x &< 2 \\ x^2 + x - 2 &< 0 \\ (x+2)(x-1) &< 0 \end{aligned}$$



$$x \in \langle -2, 1 \rangle$$

2)

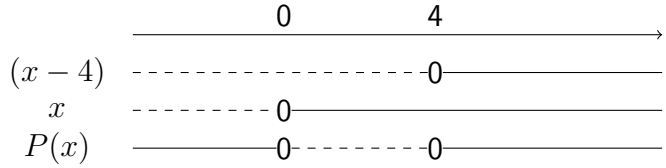
$$\begin{aligned} 1 - x^2 &< -8 \\ -x^2 + 1 + 8 &< 0 \\ x^2 - 9 &> 0 \\ (x+3)(x-3) &> 0 \end{aligned}$$



$$x \in \langle \leftarrow, -3 \rangle \cup \langle 3, \rightarrow \rangle$$

3)

$$\begin{aligned} x^2 &\geq 4x \\ x^2 - 4x &\geq 0 \\ x(x-4) &\geq 0 \end{aligned}$$

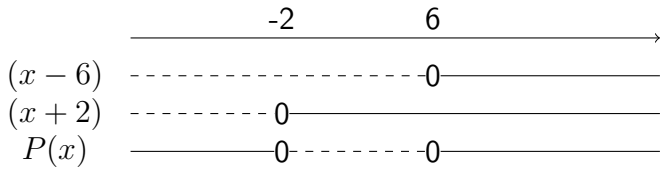


$$x \in \langle \leftarrow, 0] \cup [4, \rightarrow \rangle$$

Oppgave 7

1)

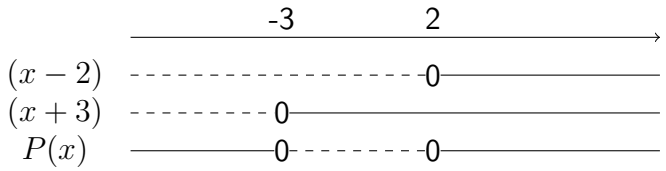
$$x^2 - 4x - 12 < 0$$
$$(x-6)(x+2) < 0$$



$$x \in \langle -2, 6 \rangle$$

2)

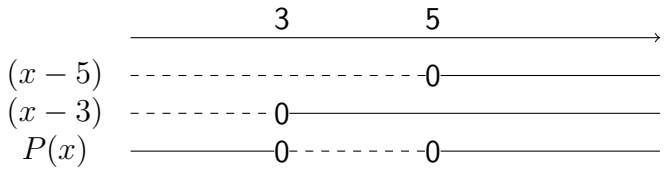
$$-x^2 - x + 6 \geq 0$$
$$x^2 + x - 6 \leq 0$$
$$(x+3)(x-2) \leq 0$$



$$x \in [-3, 2]$$

3)

$$x^2 - 8x \leq -15$$
$$x^2 - 8x + 15 \leq 0$$
$$(x-5)(x-3) \leq 0$$

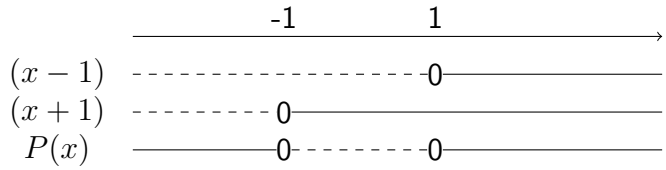


$$x \in [3, 5]$$

Oppgave 8

1)

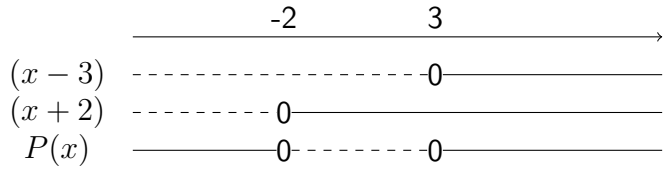
$$\begin{aligned} 1 &> x^2 \\ x^2 - 1 &< 0 \\ (x+1)(x-1) &< 0 \end{aligned}$$



$$x \in \langle -1, 1 \rangle$$

2)

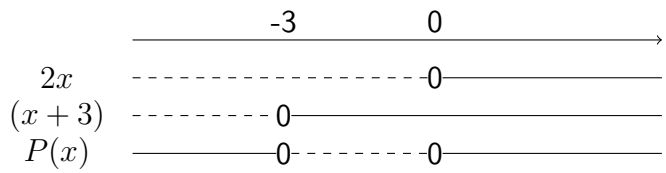
$$\begin{aligned} -x &\leq -x^2 + 6 \\ x^2 - x - 6 &\leq 0 \\ (x-3)(x+2) &\leq 0 \end{aligned}$$



$$x \in \big[-2, 3 \big]$$

3)

$$\begin{aligned} \frac{1}{2}(\frac{1}{x} + 3) &< 1 - \frac{1}{x} \\ \frac{1}{2x} + \frac{3}{2} &< 1 - \frac{1}{x} \\ \frac{1}{2x} + \frac{3x}{2x} &< \frac{2x}{2x} - \frac{2}{2x} \\ \frac{1 + 3x - 2x + 2}{2x} &< 0 \\ \frac{x+3}{2x} &< 0 \end{aligned}$$

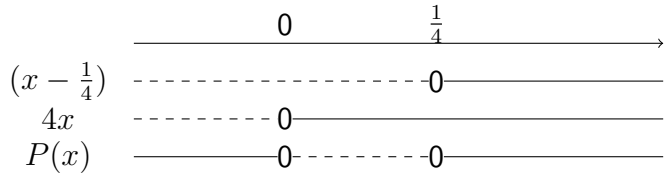


$$x \in \langle -3, 0 \rangle$$

Oppgave 9

1)

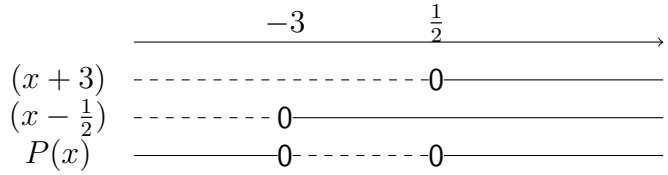
$$\begin{aligned} x - 4x^2 &\leq 0 \\ 4x^2 - x &\geq 0 \\ 4x(x - \frac{1}{4}) &\geq 0 \end{aligned}$$



$$x \in \langle \leftarrow, 0 \rangle \cup \left\langle \frac{1}{4}, \rightarrow \right\rangle$$

2)

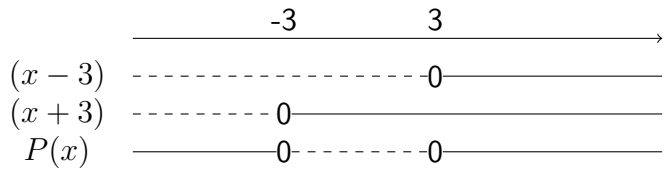
$$\begin{aligned} 2x^2 + 5x + 3 &> 0 \\ 2(x+3)\Big(x - \frac{1}{2}\Big) &> 0 \end{aligned}$$



$$x \in \langle \leftarrow, -3 \rangle \cup \langle -\frac{1}{2}, \rightarrow \rangle$$

3)

$$\begin{aligned} -3x^2 + 27 &> 0 \\ -3(x^2 - 9) &> 0 \\ (x+3)(x-3) &< 0 \end{aligned}$$

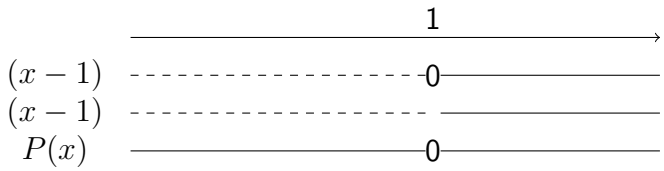


$$x \in \langle -3, 3 \rangle$$

Oppgave 10

1)

$$\begin{aligned} 1 - 2x &\geq -x^2 \\ x^2 - 2x + 1 &\geq 0 \\ (x-1)^2 &\geq 0 \end{aligned}$$



P(x) er større enn eller lik 0 for alle verdier av x.