ACMAT117 Fall 2024
Professor Manguba-Glover
Sections 3.4 Classwork (CW 10) Name: ______________________________

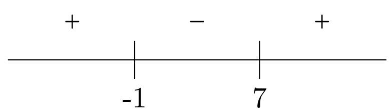
Complete as many of the following problems as you can with your group. You do not have to go in order. Each group will be given a specific problem that they must complete and present to either Professor MG or to Stefanie before they leave.

(1) Solve the following inequality. Write your answer in interval notation: $-x^2 + 6x + 7 \geq 0$

Solution

$$\begin{aligned} -x^2 + 6x + 7 \geq 0 &\Leftrightarrow x^2 - 6x - 7 \leq 0 \\ &\Leftrightarrow (x-7)(x+1) \leq 0 \end{aligned}$$

This gives us the key numbers $x = -1, 7$. Plotting on a number line and testing the intervals gives



We want the section that is ≤ 0 so our answer is $\boxed{[-1, 7]}$

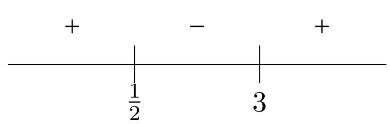
□

(2) Solve the following inequality. Write your answer in interval notation: $2x^2 - 7x + 3 > 0$

Solution

$$2x^2 - 7x + 3 > 0 \Leftrightarrow (2x-1)(x-3) > 0$$

This gives us the key numbers $x = \frac{1}{2}, 3$. Plotting on a number line and testing the intervals gives



We want the section that is > 0 so our answer is $\boxed{\left(-\infty, \frac{1}{2}\right) \cup (3, \infty)}$

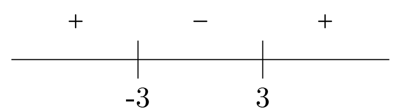
□

(3) Solve the following inequality. Write your answer in interval notation: $9 - x^2 > 0$

Solution

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

This gives us the key numbers $x = -3, 3$. Plotting on a number line and testing the intervals gives



We want the section that is < 0 so our answer is $\boxed{(-3,3)}$

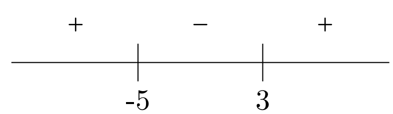
□

(4) Solve the following inequality. Write your answer in interval notation: $x^2 + 2x - 15 < 0$

Solution

$$x^2 + 2x - 15 < 0 \Leftrightarrow (x-3)(x+5) < 0$$

This gives us the key numbers $x = 3, -5$. Plotting on a number line and testing the intervals gives



We want the section that is < 0 so our answer is $\boxed{(-5,3)}$

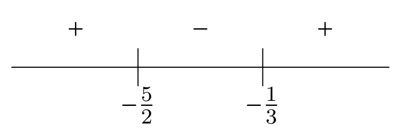
□

(5) Solve the following inequality. Write your answer in interval notation: $17x + 5 \geq -6x^2$

Solution

$$\begin{aligned} 17x + 5 \geq -6x^2 &\Leftrightarrow 6x^2 + 17x + 5 \geq 0 \\ &\Leftrightarrow (3x+1)(2x+5) \geq 0 \end{aligned}$$

This gives us the key numbers $x = -\frac{5}{2}, -\frac{1}{3}$. Plotting on a number line and testing the intervals gives



We want the section that is ≥ 0 so our answer is $\boxed{\left(-\infty, -\frac{5}{2}\right] \cup \left[-\frac{1}{3}, \infty\right)}$

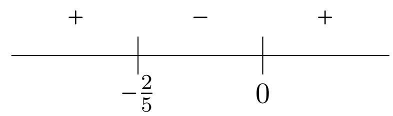
□

(6) Solve the following inequality. Write your answer in interval notation: $5x^2 + 2x \le 0$

Solution

$$5x^2 + 2x \le 0 \Leftrightarrow x(5x+2) \le 0$$

This gives us the key numbers $x = -\frac{2}{5}, 0$. Plotting on a number line and testing the intervals gives



We want the section that is ≤ 0 so our answer is $\boxed{\left[-\frac{2}{5}, 0\right]}$

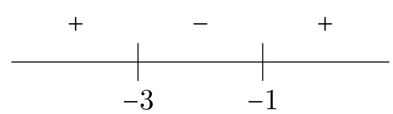
□

(7) Solve the following inequality. Write your answer in interval notation: $x^2 + 4x + 3 \le 0$

Solution

$$x^2 + 4x + 3 \le 0 \Leftrightarrow (x+3)(x+1) \le 0$$

This gives us the key numbers $x = -3, -1$. Plotting on a number line and testing the intervals gives



We want the section that is ≤ 0 so our answer is $\boxed{[-3, -1]}$

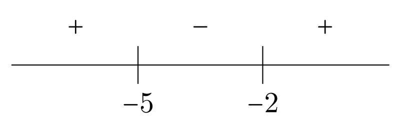
□

(8) Solve the following inequality. Write your answer in interval notation: $x^2 + 7x + 10 > 0$

Solution

$$x^2 + 7x + 10 > 0 \Leftrightarrow (x+5)(x+2) > 0$$

This gives us the key numbers $x = -5, -2$. Plotting on a number line and testing the intervals gives



We want the section that is > 0 so our answer is $\boxed{(-\infty, -5) \cup (-2, \infty)}$

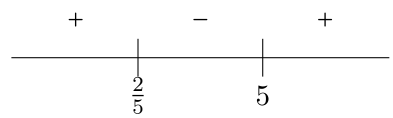
□

(9) Solve the following inequality. Write your answer in interval notation: $5x^2 - 27x \leq -10$

Solution

$$\begin{aligned} 5x^2 - 27x \leq -10 &\Leftrightarrow 5x^2 - 27x + 10 \leq 0 \\ &\Leftrightarrow (5x - 2)(x - 5) \leq 0 \end{aligned}$$

This gives us the key numbers $x = \frac{2}{5}, 5$. Plotting on a number line and testing the intervals gives



We want the section that is ≤ 0 so our answer is $\boxed{\left[\frac{2}{5}, 5\right]}$

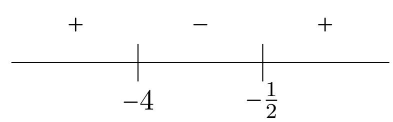
□

(10) Solve the following inequality. Write your answer in interval notation: $2x^2 + 4x + 4 > -5x$

Solution

$$\begin{aligned} 2x^2 + 4x + 4 > -5x &\Leftrightarrow 2x^2 + 9x + 4 > 0 \\ &\Leftrightarrow (2x + 1)(x + 4) > 0 \end{aligned}$$

This gives us the key numbers $x = -\frac{1}{2}, -4$. Plotting on a number line and testing the intervals gives



We want the section that is > 0 so our answer is $\boxed{(-\infty, -4) \cup \left(-\frac{1}{2}, \infty\right)}$

□

Key:

(1) $[-1, 7]$
(2) $\left(-\infty, \frac{1}{2}\right) \cup (3, \infty)$
(3) $(-3, 3)$
(4) $(-5, 3)$
(5) $\left(-\infty, -\frac{5}{2}\right] \cup \left(-\frac{1}{3}, \infty\right)$
(6) $\left[-\frac{2}{5}, 0\right]$
(7) $[-3, -1]$
(8) $(-\infty, -5) \cup (-2, \infty)$
(9) $\left[\frac{2}{5}, 5\right]$
(10) $(-\infty, -4) \cup \left(-\frac{1}{2}, \infty\right)$