Some Review

1. Solve & graph:
   \[-2 \leq 3x + 4 < 19\]
   \[-2 - 4 \leq 3x < 19 - 4\]
   \[-6 \leq 3x < 15\]
   \[\frac{-6}{3} \leq \frac{x}{1} < \frac{15}{3}\]
   \[\frac{-2}{1} \leq x < \frac{5}{1}\]
   \[\boxed{\left[-\frac{2}{1}, \frac{5}{1}\right]}\]

2. Write using function notation:
\[5x - 2y = 8\]
\[y = \frac{5}{2}x - 4\]
\[f(x) = \frac{5}{2}x - 4\]
Solve

1. \(|4x+5| = -3\)
   \[\emptyset\]

2. \(|4x+5| = 3\)
   \[4x+5 = 3 \text{ or } 4x+5 = -3\]
   \[x = -2 \text{ or } x = -8\]
   \[\{ -2, -\frac{1}{2} \}\]

3. \(|4x+5| \geq 3\)
   \((-\infty, -2] \cup [-\frac{1}{2}, \infty)\) or Interval Notation.

Solve and Graph

\[|5x - 3| = |2x + 6|\]
\[5x - 3 = \pm (2x + 6)\]
\[5x - 3 = 2x + 6 \text{ or } 5x - 3 = -(2x + 6)\]
\[5x - 3 = 2x + 6\]
\[5x - 3 = -2x - 6\]
\[3x = 9\]
\[x = 3\]
\[\{ \frac{3}{1}, 3 \}\]

\[|2x - 7| < 7\]
\[|2x - 7| = 7\]
\[2x - 7 = 7 \text{ or } 2x - 7 = -7\]
\[2x = 14 \text{ or } 2x = 0\]
\[x = 7 \text{ or } x = 0\]
\[(0, 7)\]
Compound inequalities

① with OR
Solve & graph each one
OR → Takes whatever is shaded

② with AND
Solve & graph each one
AND → Take only the common shaded region (overlap)

Solve

\[ 3x - 5 < 4 \quad OR \quad 2x + 3 \geq 29 \]

\[ 3x < 4 + 5 \quad 2x \geq 29 - 3 \]
\[ 3x < 9 \quad 2x \geq 26 \]
\[ x < 3 \quad OR \quad x \geq 13 \]

\((-\infty, 3) \cup [13, \infty)\)
Solve
\[-2x + 5 < 13 \quad \text{AND} \quad 5x - 2 \leq 28\]
\[-2x < -8\]
\[x > -4\]
\[\text{overlap}\]
\[\{-4, 6\}\]
\[\{x \mid -4 < x < 6\}\]

Solve, graph, give ans in interval notation
\[-x - 2 < 5 \quad \text{OR} \quad 3x + 1 < -20\]
\[-x < 7\]
\[x > -7 \quad \text{OR} \quad x < -\infty\]
\[\{-\infty, -7\} \cup (-7, \infty)\]
Solve, graph, final ans in interval notation
\[5 - x > 7 \text{ and } 2x + 3 \geq 13\]
\[-x > 2 \quad 2x \geq 10\]
\[x < -2 \text{ AND } x \geq 5\]

No overlap $\rightarrow$ NO Solution

\[
\begin{align*}
A &= \{2, 3, 4, 5\} \\
B &= \{6, 7, 8, 9\} \\
C &= \{5, 6\}
\end{align*}
\]

Find
1) \(A \cup B\)  
   \[= \{2, 3, 4, 5, 6, 7, 8, 9\}\]

2) \(A \cap B\)
   \[\text{Wrong Ans} \quad \{\emptyset\}\]

3) \(A \cup C\)
   \[= \{2, 3, 4, 5, 6\}\]

4) \(A \cap C\)
   \[= \{5\}\]
   \[\text{Wrong ans} \quad 5\]

5) \(B \cup C\)
   \[= \{5, 6, 7, 8, 9\}\]

6) \(B \cap C\)
   \[= \{6\}\]
   \[\text{Wrong Ans} \quad 6\]
Given \( f(x) = 3x - 5 \)

Solve \(-11 \leq f(x) < 4\).

\[-11 \leq 3x - 5 < 4\]

\[-6 \leq 3x < 9\]

\[-2 \leq x < 3\]

S.B.N. \( \{ x \mid -2 \leq x < 3 \} \) \([-2, 3) I.N.

Solve, Ans in interval notation

\( 3(x-1) < 12 \) or \( x + 7 > 10 \)

\( 3x - 3 < 12\)

\( x > 10 - 7\)

\( 3x < 15\)

\( x > 3\)

\( R \rightarrow (-\infty, \infty)\)

\( 3(x-1) < 12 \) and \( x + 7 > 10 \)

\( (3, 5)\)
\[ f(x) = 2x - 1 \]
Solve \[ 3 \leq |f(x)| < 15 \]

\[ 3 \leq |2x-1| < 15 \]

\[ |2x-1| \geq 3 \text{ AND } |2x-1| < 15 \]

\[ |2x-1| = 3 \]
\[ 2x-1 = 3 \]
\[ 2x-1 = -3 \]
\[ x = 2 \]
\[ x = -1 \]

\[ |2x-1| = 15 \]
\[ 2x-1 = 15 \]
\[ 2x-1 = -15 \]
\[ x = 8 \]
\[ x = -7 \]

I.N. \((-7, -1] \cup [2, 8)\)
S.B.N. \(\{x \mid -7 < x \leq -1 \text{ or } 2 \leq x < 8\}\)
Simplify: \[
\frac{x^2 - 4}{x^3 - 8} = \frac{A^2 - B^2}{A^3 - B^3}
\]

\[A^2 - B^2 = (A + B)(A - B)\]

\[A^3 - B^3 = (A - B)(A^2 + AB + B^2)\]

\[\chi^2 - 4 = \chi^2 - 2^2\]

\[\chi^3 - 8 = \chi^3 - 2^3\]

\[
\frac{(x+2)(x-2)}{(x-2)(x^2 + 2x + 4)} = \frac{x + 2}{x^2 + 2x + 4}
\]

Simplify: \[
\frac{2x^2 - 9x + 9}{8x - 12} \div \frac{x^2 - 3x}{2x}
\]

\[= \frac{2x^2 - 9x + 9}{8x - 12} \cdot \frac{2x}{x^2 - 3x}\]

\[= \frac{(2x - 3)(x - 3)}{4(2x - 3)} \cdot \frac{2x}{x(x - 3)}\]

\[= \frac{2}{4} = \frac{1}{2}\]
Simplify:

\[
\frac{x + 7}{x^2 + 5x + 6} - \frac{4}{x^2 + 5x + 6} = \frac{x + 7 - 4}{x^2 + 5x + 6} = \frac{x + 3}{x^2 + 5x + 6} = \frac{1}{(x + 2)(x + 3)} = \frac{1}{x + 2}
\]

Simplify:

\[
\frac{3}{x^2 + 2x - 8} - \frac{2}{x^2 - 3x + 2} = \frac{3(\text{cancel}) - 2(\text{cancel})}{(x + 1)(x - 2)(x - 1)} = \frac{\text{cancel}}{(x + 1)(x - 2)(x - 1)} = \frac{x - 11}{(x + 1)(x - 2)(x - 1)}
\]
Solve: \[ \frac{x}{x+3} + 4 = \frac{x}{x+3} \]

\[ \text{LCD} = x+3, \quad \text{E.V.:} -3 \]

\( x + 4(x+3) = x \)

\( 4(x+3) = 0 \)

\( 4x + 12 = 0 \)

\( x = \frac{-12}{4} \)

\( x = -3 \)

\( \emptyset \)

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Solve: \[ 2x - \frac{14}{x-1} = 4 - \frac{2x}{x-1} \]

\( \text{LCD} = x-1, \quad \text{E.V.:} \ 1 \)

\( x(x-1) - 14 = 4(x-1) - 2x \)

\( x^2 - x - 14 = 4x - 4 - 2x \)

\( x^2 - x - 14 = 2x - 4 \)

\( x^2 - x - 14 = 0 \)

\( (x-5)(x+2) = 0 \)

\( x = 5 \quad \text{or} \quad x = -2 \)

\{ -2, 5 \}
Exam 1: Monday
9:00 – 10:20
You can come as early as 8:30 to have extra time.

Materials: SG 1 – SG 6
& Project 1

Due Monday: SG 5 & 6.

Nothing due tomorrow → New materials tomorrow.