

Name: _____

Key

GTID: _____

Answer the questions in the spaces provided and BOX your answer. Organize and show your work for full credit.

1. Find $(A \cup B) \cap (C \cup D)$.

$$A = \{1, 2\}, \quad B = \{1, 3, 5\}, \quad C = \{2, 4\}, \quad D = \{2, 3, 4\}.$$

$$A \cup B = \{1, 2\} \cup \{1, 3, 5\} = \{1, 2, 3, 5\}$$

$$C \cup D = \{2, 3, 4\}$$

$$(A \cup B) \cap (C \cup D) = \{1, \underline{2}, \underline{3}, 5\} \cap \{\underline{2}, \underline{3}, 4\} = \boxed{\{2, 3\}}$$

2. Simplify: $\left(\frac{x^6}{4y}\right)(2xy^{-1})^3$

$$\frac{x^6}{4y} \cdot 2^3 x^3 y^{-3} = \frac{8 \cdot x^6 \cdot x^3}{4y y^3} = \boxed{\frac{2x^9}{y^4}}$$

3. Simplify: $(x^2 + x - 2)(x - 3)$

$$(x^2 + x - 2)x + (x^2 + x - 2)(-3)$$

$$= x^3 + x^2 - 2x - 3x^2 - 3x + 6$$

$$= \boxed{x^3 - 2x^2 - 5x + 6}$$

4a. Solve: $4x^2 + x - 3 = 0$

Hint: quadratic formula.

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$x = \frac{-1 \pm \sqrt{1 - 4(4)(-3)}}{2(4)}$$

$$= \frac{-1 \pm \sqrt{1 + 48}}{8} = \frac{-1 \pm \sqrt{49}}{8} = \frac{-1 \pm 7}{8}$$

4b. Factor: $4x^2 + x - 3$

Hint: use your answer from #4a.

$$(4x - 3)(x + 1)$$

$$\uparrow$$

$$x = 3/4$$

$$\uparrow$$

$$x = -1$$

$$x = \frac{-1-7}{8} \text{ and } x = \frac{-1+7}{8}$$

$$\text{So } x = \frac{-8}{8} \text{ and } x = \frac{6}{8}$$

$$x = -1, 3/4$$

alt approach (also ok)

use grouping.

$$\begin{array}{r} -12 \\ \diagdown \quad \diagup \\ 4 \quad +1 \quad -3 \end{array} = 1.$$

$$4x^2 + x - 3 = 4x^2 + 4x - 3x - 3$$

$$= 4x(x+1) + (-3)(x+1)$$

$$= (4x - 3)(x + 1) \quad \checkmark$$

5. Simplify: $\frac{-10}{-3-i}$

$$\frac{-10}{-3-i} \times \frac{-3+i}{-3+i} = \frac{+30 - 10i}{9 - i^2} = \frac{30 - 10i}{9 + 1} = \frac{30 - 10i}{10}$$

$$= 3 - i$$