This homework assignment covers Chapter 1: 1.1, 1.2, 1.3, 1.4, and 1.5. Please work as many problems as possible and turn in your work by the due date. Late homework is NOT accepted. As always, if you need anything, please email me.

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1. The set of numbers between but not including 2 and 7 can be written as follows:
   - in set-builder notation:
     - \( \{ x \mid 2 < x \leq 7 \} \)
     - \( \{ x \mid 2 < x < 7 \} \)
     - \( \{ x \mid 2 \leq x < 7 \} \)
     - \( \{ x \mid 2 \leq x \leq 7 \} \)

   in interval notation:
   - \([2, 7)\]
   - \((2, 7]\)
   - \([2, 7]\)
   - \([2, 7)\]

2. List the elements of the given set that are natural numbers, integers, rational numbers, and irrational numbers. (Enter your answers as comma-separated lists.)

   \[ \{ 0, -19, 50, \frac{22}{7}, 0.538, \sqrt{3}, -\frac{1}{3}, \sqrt{2} \} \]

   (a) natural numbers

   (b) integers

   (c) rational numbers

   (d) irrational numbers
List the elements of the given set that are natural numbers, integers, rational numbers, and irrational numbers. (Enter your answers as comma-separated lists.)

\[ \{1.001, \frac{4}{9}, -\pi, -12, 12, \frac{13}{15}, \sqrt{64}, 3.14, \frac{21}{3}\} \]

(a) natural numbers

(b) integers

(c) rational numbers

(d) irrational numbers

4. Find the indicated set if given the following. (Enter EMPTY for the empty set.)

\[ A = \{1, 2, 3, 4, 5, 6, 7\} \quad B = \{3, 5, 7, 9\} \quad C = \{7, 8, 9, 10\} \]

(a) \( A \cup B \)

(b) \( A \cap B \)

5. Find the indicated set if given the following. (Enter EMPTY for the empty set.)

\[ A = \{1, 2, 3, 4, 5, 6, 7\} \quad B = \{1, 3, 6, 10\} \quad C = \{7, 8, 9, 10\} \]

(a) \( A \cup B \cup C \)

(b) \( A \cap B \cap C \)
Find the indicated set if given the following.

\[ A = \{ x \mid x \geq -2 \} \quad B = \{ x \mid x < 7 \} \quad C = \{ x \mid -1 < x \leq 8 \} \]

(a)  \( B \cup C \)
- \( \{ x \mid x < 8 \} \)
- \( \{ x \mid x \leq 8 \} \)
- \( \{ x \mid 7 < x < 8 \} \)
- \( \{ x \mid 7 \leq x \leq 8 \} \)
- all real numbers
- none of these

(b)  \( B \cap C \)
- \( \{ x \mid -2 < x < 7 \} \)
- \( \{ x \mid -2 \leq x \leq 7 \} \)
- \( \{ x \mid -1 < x < 7 \} \)
- \( \{ x \mid -1 \leq x \leq 7 \} \)
- all real numbers
- none of these

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Find the indicated set if given the following.

\[ A = \{ x \mid x \geq -3 \} \quad B = \{ x \mid x < 5 \} \quad C = \{ x \mid -1 < x \leq 6 \} \]

(a)  \( A \cap C \)
- \( \{ x \mid -3 \leq x < 5 \} \)
- \( \{ x \mid -3 \leq x \leq 5 \} \)
- \( \{ x \mid -1 < x \leq 6 \} \)
- \( \{ x \mid -1 \leq x \leq 6 \} \)
- none of these

(b)  \( A \cap B \)
- \( \{ x \mid -3 \leq x < 5 \} \)
- \( \{ x \mid -3 \leq x \leq 5 \} \)
- \( \{ x \mid -1 < x \leq 6 \} \)
- \( \{ x \mid -1 \leq x \leq 6 \} \)
- none of these
8. Simplify the expression and eliminate any negative exponent(s).
   (a) \((8x^3y^5)(2x^7y^3)\)
   (b) \((10a^8z^6)(\frac{1}{2}a^5z^3)\)

9. Simplify the expression and eliminate any negative exponent(s).
   (a) \(\frac{8y^7z}{2y^3z^4}\)
   (b) \(\frac{(xy^2z^3)^4}{(x^2y^2z)^3}\)

10. Simplify the expression and eliminate any negative exponent(s).
    (a) \(\frac{20a^3b^{-9}}{5a^7b^9}\)
    (b) \(\left(\frac{y}{2x^{-5}}\right)^{-2}\)

11. Simplify the expression. Assume \(x\) denotes any real number.
    \(\sqrt[6]{x^6}\)
12. **Question Details**

Simplify the expression. Assume \( x \) denotes any real number.

\[ \sqrt[5]{32x^{30}} \]

13. **Question Details**

Simplify the expression and eliminate any negative exponent(s). Assume that all letters denote positive numbers.

(a) \[ \sqrt[7]{x^2y^3} \cdot \sqrt[14]{x^2y^{24}} \]

(b) \[ \frac{\sqrt[5]{32x^2}}{\sqrt{x}} \]

14. **Question Details**

Consider the polynomial \( 2x^6 + 10x^5 + 12x^4 \).

How many terms does this polynomial have?

List the terms. (Enter your answers as a comma-separated list.)

What factor is common to each term?

Factor the polynomial \( 2x^6 + 10x^5 + 12x^4 \).

15. **Question Details**

Factor the trinomial.

\[ 5x^2 - 47x + 56 \]
16. Factor the trinomial.
   \[7x^2 - 54x - 16\]

17. Factor the trinomial.
   \[(3x + 2)^2 + 14(3x + 2) + 48\]

18. Use a Special Factoring Formula to factor the expression.
   \[(x + 8)^2 - 16\]

19. Use a Special Factoring Formula to factor the expression.
   \[8x^3 + y^3\]

20. Use a Special Factoring Formula to factor the expression.
   \[1 + 27y^3\]

21. Factor the expression by grouping terms.
   \[7x^3 - 5x^2 + 14x - 10\]
22. Factor the expression by grouping terms. 
\[ x^3 + 9x^2 - 3x - 27 \]

23. Factor the expression completely. 
\[ 15x^3 + 10x \]

24. Factor the expression completely. 
\[ x^2 - 7x - 8 \]

25. Factor the expression completely. 
\[ 3x^2 - 12x - 63 \]

26. Which of the following are rational expressions?

(a) \( \frac{2x}{x^2 - 3} \)
- rational
- not rational

(b) \( \frac{\sqrt{x + 3}}{7x + 4} \)
- rational
- not rational

(c) \( \frac{x(x^2 - 2)}{x + 8} \)
- rational
- not rational
27. Find the domain of the expression.
\[ 2x^2 - 16x + 7 \]
- \( x \leq 0 \)
- \( x < 7 \)
- \( x > 7 \)
- \( x \geq 0 \)
- all real numbers

28. Find the domain of the expression.
\[ \frac{5x + 1}{x - 4} \]
- \( x \leq 0 \)
- \( x > 4 \)
- \( x \neq 4 \)
- all real numbers
- \( x < 0 \)

29. Find the domain of the expression.
\[ \sqrt{x + 5} \]
- \( x \geq -5 \)
- all real numbers
- \( x > -5 \)
- \( x < -5 \)
- \( x \leq 0 \)

30. Find the domain of the expression.
\[ \frac{1}{\sqrt{x - 5}} \]
- \( x \geq 5 \)
- \( x > 5 \)
- \( x < 5 \)
- \( x \leq 0 \)
- all real numbers
31. Question Details

Find the domain of the expression.

\[
\frac{x^2 + 6}{x^2 - 3x - 18}
\]

- \(-3 < x < 6\)
- \(x \neq 6, -3\)
- \(x > 6\)
- \(x < -3\)
- all real numbers

32. Question Details

Simplify the rational expression. (Give your answer in factored form.)

\[
\frac{x^2 - x - 30}{x^2 - 25}
\]

33. Question Details

Perform the addition or subtraction and simplify. (Give your answer in factored form.)

\[
4 + \frac{x}{x + 6}
\]

34. Question Details

Perform the addition or subtraction and simplify. (Give your answer in factored form.)

\[
\frac{1}{x + 2} + \frac{6}{x - 1}
\]

35. Question Details

The given equation is either linear or equivalent to a linear equation. Solve the equation. (If there is no solution, enter NO SOLUTION. If all real numbers are solutions, enter REALS.)

\[2x - 8 = 3\]

\[x = \]

36. Question Details

The given equation is either linear or equivalent to a linear equation. Solve the equation. (If there is no solution, enter NO SOLUTION. If all real numbers are solutions, enter REALS.)

\[6x + 9 = 57\]

\[x = \]
37. The given equation is either linear or equivalent to a linear equation. Solve the equation. (If there is no solution, enter NO SOLUTION. If all real numbers are solutions, enter REALS.)

\[ 15t - 13 = 7 - 15t \]

\[ t = \]

38. The given equation is either linear or equivalent to a linear equation. Solve the equation. (If there is no solution, enter NO SOLUTION. If all real numbers are solutions, enter REALS.)

\[ \frac{5}{x - 1} + \frac{6}{x + 1} = \frac{6}{x^2 - 1} \]

\[ x = \]

39. Solve the equation for the indicated variable.

\[ F = G \frac{mm}{r^2}; \] for \( m \)

\[ m = \]

40. Solve the equation for the indicated variable.

\[ \frac{1}{R} = \frac{1}{R_1} + \frac{1}{R_2}; \] for \( R_2 \)

\[ R_2 = \]

41. Solve the equation by factoring.

\[ x^2 + 3x - 4 = 0 \]

\[ x = \] (smaller value)

\[ x = \] (larger value)

42. Solve the equation by factoring.

\[ 4x^2 - 4x - 3 = 0 \]

\[ x = \] (smaller value)

\[ x = \] (larger value)
43. Solve the equation by factoring.

\[ 5x^2 + 14x = 3 \]

\[ \begin{align*}
x &= \quad \text{(smaller value)} \\
x &= \quad \text{(larger value)}
\end{align*} \]

44. Solve the equation by factoring.

\[ 6x(x - 1) = 6 - 11x \]

\[ \begin{align*}
x &= \quad \text{(smaller value)} \\
x &= \quad \text{(larger value)}
\end{align*} \]

45. Solve the equation by factoring.

\[ 2x^2 - 50 = 0 \]

\[ \begin{align*}
x &= \quad \text{(smaller value)} \\
x &= \quad \text{(larger value)}
\end{align*} \]

46. Solve the equation by factoring.

\[ (2x - 9)^2 = 8 \]

\[ \begin{align*}
x &= \quad \text{(smaller value)} \\
x &= \quad \text{(larger value)}
\end{align*} \]