Math 150 Week in Review 1 Problem Set

1. For the following, list of numbers, classify each according to what type(s) of number(s) it is.

   \(-7, 0.46, 0.78\overline{4}, \pi^2, \sqrt{81}, \sqrt{8}, 1, \frac{12}{7}\)

   \- Natural Numbers:
   \- Integers:
   \- Rational Numbers:
   \- Irrational Numbers:

2. Graph the following sets and write the solution in interval notation.

   (a) \((-12, 3) \cup (-11, 4]\)

   (b) \(\left(\frac{4}{15}, \infty\right) \cap \left[\frac{9}{15}, 1\right]\)

3. Evaluate \(\left|\frac{-3 - |-2|}{\frac{2}{5}}\right| - 7\).
4. Find the distance between the points $-\frac{5}{21}$ and $-\frac{11}{18}$.

5. Simplify the following expressions and eliminate any negative exponents. Assume all variables denote positive numbers.

(a) \( \left( \frac{2x^2y^{-4}}{x^{-3}y^6} \right)^{-4} \left( \frac{3x}{y} \right)^2 \)

(b) \( \frac{(-32x^3y^{-2})^{-2/5}}{(81x^2y^3)^{-3/4}} \)

6. Write the following as a single power of \( x \). Assume \( x \) denotes a positive number.

\( \frac{\sqrt[4]{x^5} \sqrt[3]{x^7}}{\sqrt[6]{x^3}} \)
7. Simplify the following expressions.
   
   (a) $\sqrt{18a^{12}b^{10}}$

   (b) $\sqrt[3]{24x^{22}} + \sqrt[3]{81x^{16}}$

8. Expand and simplify
   
   (a) $(x^3y - xy + y^3)(x^2y^2 - 3x^4)$

   (b) $(2x + 3)^3 - (6x - 5)^2 + (7x - 4)(7x + 4)$
9. Factor the following expressions completely.
   
   (a) \(9x^3 - 36x^2 - 25x + 100\)

   (b) \(16(2x - 1)^2 + 40(2x - 1) + 25\)

   (c) \(2x^{13/5} - 128x^{-2/5}\)

10. Find the domain of the following rational expressions. Write your answer in interval notation.

   (a) \(\frac{x^3 - 3x^2 + 1}{x^4 + 2}\)

   (b) \(\frac{x^2 - 9}{x^2 - 25}\)
11. Perform the operation and simplify

\begin{align*}
\text{(a)} & \quad \frac{3x^2 - 13x - 10}{x^2 - 2x - 15} - \frac{x^2 - 12}{5x^2 - 21x + 4} \\
\text{(b)} & \quad \frac{x}{x^2 - 16} + \frac{3}{x^2 - 8x + 16} - \frac{1}{x + 4}
\end{align*}
12. Simplify these compound fractions.

(a) \( \frac{\frac{1}{x+y} + \frac{1}{y}}{\frac{1}{x} + \frac{1}{x+y}} \)

(b) \( \frac{2(x-2)^{-3/4} + (x-2)^{2/3}}{(x-2)^{5/4}} \)

13. Rationalize the denominators of the following expressions.

(a) \( \frac{7}{\sqrt{x^3}} \)

(b) \( \frac{\sqrt{x}}{\sqrt{x+h} - \sqrt{x}} \)