Algebra 1
Unit 9 – Project
Working with Functions

Instructions: Answer **ALL** questions. You **MUST** attach all graph/sketches and show all calculations and/or explanations to justify your answers. If you are asked to provide a graph, you **MUST** use graph paper or a graphing utility/software. Upload the completed project as a Word or PDF file.

1. How does each graph compare to the graph of $f(x) = \sqrt{x}$?

   a. $g(x) = \sqrt{x} + 4$

   b. $g(x) = \sqrt{x} - 8$

2. Write an expression that represents $g(x)$, which is a translation 5 units down of $f(x) = \sqrt{x}$.

3. Graph the function $f(x) = -\sqrt{x} - 3$. State the domain and range of the function.

4. For each function, identify the intercepts and describe the intervals over which the function is positive and negative.

   a. $g(x) = x^3 - 1$

   b. $r(x) = \sqrt[3]{x - 1}$

5. Describe the translations that transform the graph of $f(x) = x^3$ into the graph of the given function.

   a. $h(x) = (x + 8)^3$

   b. $m(x) = 10 + x^3$

6. Find $f + g$ for $f(x) = 3x^2 + 5x$; $g(x) = 2x - 8$

7. Find $f \cdot g$ for $f(x) = 5x^2 + 2x$; $g(x) = 3x - 1$

8. Identify the rule and the domain for $\dfrac{f}{g}$ for $f(x) = x - 3$; $g(x) = x^2 + 3x - 18$