1. Using the rules of exponents, simplify the following expression. Write your answer with positive exponents. Assume that all variables represent positive real numbers.

\[
\frac{1}{r^3} \cdot r^{-6} \cdot r^2
\]

\[
\left( r^{-6} \right)^{-3}
\]

2. Simplify the following expression involving a rational exponent:

\[
\left( -\frac{27}{125} \right)^\frac{2}{3}
\]
3. Write the following radical expression with rational exponents, and then apply the properties of exponents in order to simplify the expression. Assume that all radicands represent positive real numbers. Give answers in exponential form.

\[ \sqrt[5]{b^3} \cdot \sqrt[3]{b^4} \]

4. Express the following in simplified form. Assume that all variables represent positive real numbers.

\[ \sqrt[6]{\frac{t^6}{121s^7}} \]

5. Simplify the following difference of radical expressions. Assume that all variables represent positive real numbers.

\[ 9 \sqrt[3]{128k} - 5 \sqrt[3]{54k} \]
6. Rationalize the denominator in the following expression. Assume that all variables represent positive real numbers.

\[ \frac{-2}{\sqrt{5} - 3} \]

7. On the graph paper provided, accurately graph the following radical function and give its domain and range (in the space provided below, \([D_f \text{ and } R_f]\)).

\[ f(x) = \sqrt{x+3} + 2 \]

\[ D_f: \]

\[ R_f: \]

8. Using the power rule, solve the following radical equation. Remember that you must always check all your solutions since the power rule often yields extraneous solutions. Also remember to express your solutions in correct form (set notation).

\[ \sqrt{z+6} - \sqrt{z-6} = 2 \]
9. Simplify the following using the product of a real number and the complex number \( i \). All radical expressions should be simplified.

\[
\sqrt{\frac{-216}{3}}
\]

10. Write the following ratio as a complex number of the form “a + bi”.

\[
\frac{1+i}{1-i}
\]

**Extra Credit:** What is the simplified value for \( i^{213} \)