1. Graph the quadratic function $f(x) = -x^2 - 2x + 2$, following the steps below.

(a) Write the function in the form $f(x) = a(x - b)^2 + c$.

Answer: $f(x) = $ 

(b) Use the quadratic formula to find the zeros of $f(x)$ (also known as the $x$-intercepts). That is, find the points $x_1$ and $x_2$ such that $f(x_1) = f(x_2) = 0$.

Answer: $x_1 = x_2 = $ 

(c) Now plot $f(x)$ by starting with $x^2$ in the first figure below, and then drawing a sequence of graphs ending with $f(x)$ in the fourth figure below.

(d) What is domain and range of $f(x)$?
2. Recall that water freezes at 0°C Celsius and 32°F Fahrenheit, while it boils at 100°C and 212°F. If your friend emails you from Korea and tells you the temperature today is 25°C, obviously she means Celsius. What is the temperature in Korea in Fahrenheit? (Hint: You can either use the linear equation relating Fahrenheit to Celsius, if you remember it, or you can recover it by plotting the two points I gave you above, (0, 32) and (100, 212), finding the slope, etc.)

3. (a) Define a polynomial of degree $n$:

(b) If $f(x)$ is a polynomial and $f(a) = 0$, then one factor of the polynomial is __________.

4. If $f(x)$ is the function you plotted in problem 1, what is the domain of the function $g(x) = \sqrt{f(x)}$?

5. Simplify.

(a) Write $x^a x^b$ using only one $x$ symbol. $x^a x^b =$

(b) Write $z^p$ using only one $z$ symbol. $\frac{z^p}{z^q} =$

(c) $\log_a(xy) =$

(d) $\ln e^{1/2} =$

6. True or False (Circle the correct answer.)

(a) $\frac{\log_a(x)}{\log_a(y)} = \log_a(x) - \log_a(y)$. True False

(b) $\ln e = 1$. True False

(c) $(x^2)^3 = x^5$. True False

(d) $e^0 = 1$. True False

(e) $(a + b)^n = a^n + b^n$. True False