Put answers in spaces provided unless otherwise stated. SHOW ALL WORK. (No Work = No Credit)
Remember that you lose points for sloppy work, not following directions, and unclear answers.
Reduce all fractions and simplify all radicals. In other words, simplify answers completely.

(9 points)
1. Determine the vertex form of the quadratic function \( f(x) = x^2 + 4x - 5. \) Find the intercepts, maximum or minimum, and range. Graph the function. Label all of the coordinates of intercepts on the graph.

\[
\begin{align*}
 h &= \frac{-b}{2a} = - \frac{4}{2(1)} = -2 \\
 k &= f(-2) = (-2)^2 + 4(-2) + 5 = 4 - 8 + 5 = -9 \\
 0 &= x^2 + 4x - 5 \\
 0 &= (x+5)(x-1) \\
 x &= -5, x = 1
\end{align*}
\]

Vertex form: \( f(x) = (x+2)^2 - 9 \)

Intercepts: \((-5,0), (1,0), (0,-5)\)

Maximum/Minimum: \(-9\)

Range: \([-9, \infty)\)

(8 points)
2. Graph the function. Label the coordinates of all endpoints and intercepts on the graph.

\[
f(x) = \begin{cases} 
  x + 1 , & x \leq -1 \\
  x^2 , & x > 0 
\end{cases}
\]

\[
\begin{array}{c|c|c|c|c|c|c|c}
 x & -1 & 0 & -2 & -3 & \hline
 x^2 & 1 & 0 & 4 & -2 \\
\end{array}
\]

\[
(1,9), (0,0), (2,4)
\]
3. Using the graph of $f(x)$, graph each of the following. Label at least 2 points on each graph.

a. $y = 2f(x + 3)$  
   vertical stretch by 2

b. $y = -f(x) + 2$  
   reflect over x-axis, up 2