Practices on Shiftings, Compressions and Expansions, and Reflections.

1. Let $f(x) = x^2$.
   a. Find the function $g$ (write down the function) so that $y = g(x)$ is a reflection of $y = f(x)$ with respect to the $x$-axis;
   b. Find the function $h$ (write down the function) so that $y = h(x)$ is a shifting of $y = f(x)$ left 30 units and down 30 units.
   c. Find the function $k$ (write down the function) so that $y = k(x)$ is a shifting of $y = g(x)$ left 30 units and down 30 units.
   d. If $l(x) = -\frac{1}{2}x^2$, sketch $y = f(x)$ and $y = l(x)$ together.

2. If $f(x) = -(x - 1)(x - 3)$
   a. Describe the relationship between $y = f(x)$ and $y = -f(x)$. Sketch the graph of $y = -f(x)$.
   b. Describe the relationship between $y = f(x)$ and $y = f(-x)$. Sketch the graph of $y = f(-x)$.
   c. Describe the relationship between $y = f(x)$ and $y = f(x + 3)$. Sketch the graph of $y = f(x + 3)$.
   d. Describe the relationship between $y = f(x)$ and $y = f(x) + 3$. Sketch the graph of $y = f(x) + 3$.

3. If $f(x) = -\sqrt{x - 1}$
   a. Describe the relationship between $y = f(x)$ and $y = -f(x)$. Sketch the graph of $y = -f(x)$.
   b. Describe the relationship between $y = f(x)$ and $y = f(-x)$. Sketch the graph of $y = f(-x)$.
   c. Describe the relationship between $y = f(x)$ and $y = f(x - 3)$. Sketch the graph of $y = f(x - 3)$.
   d. Describe the relationship between $y = f(x)$ and $y = f(x) - 3$. Sketch the graph of $y = f(x) - 3$.
   e. Describe the relationship between $y = f(x)$ and $y = 2f(x)$. Sketch the graph of $y = 2f(x)$. 