Math 1410: Worksheet 3

September 3, 2021

Name: _____

1. Consider the function $f(x) = x^2$.
   (a) Write an expression for the function whose graph is the graph of $f(x)$ translated downward by 4 and rightward by 2.
   (b) Write an expression for the function whose graph is the graph of $f(x)$ stretched vertically by a factor of 3 and then translated leftward by 3.
   (c) What geometric transformations are applied to the graph of $f(x)$ to get the graph of $g(x) = -(x-1)^2 + 2$?
   (d) Sketch a graph of $g(x)$, identifying its vertex. (You are not asked to identify its zeroes.)

2. Consider the quadratic function $f(x) = -x^2 - 2x - 4$.

   (a) Write this function in the form $f(x) = a(x - h)^2 + k$.

   (b) Use this rewritten form to determine the vertex of $f(x)$, sketch a graph of $f(x)$, and determine the range of f.

   (c) What is the image of $(-3, 0]$ under f?

   (d) What is the preimage of $(-5, -4]$ under f?