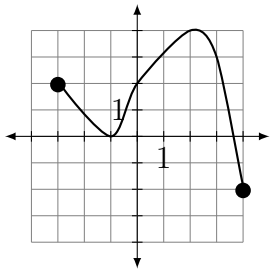
Show work for problems 2 and 5; use the back of the sheet if necessary.

1. **(3 points)** Giving your answers either in interval form or as inequalities in x, identify the intervals on the following graph on which the function graphed is increasing and the intervals on which it is decreasing. Label which is which.



2. **(4 points)** Determine the average rate of change of the function $f(z) = 1 - 3z^2$ between $z = -1$ and $z = 2$.

3. **(6 points)** Suppose we know what the graph of $f(x)$ looks like. Describe the transformations used to produce the graph of each of the following functions from the graph of $f(x)$.

   (a) $g(x) = -2f(x)$.

   (b) $h(x) = f(x + 2)$.

   (c) $r(x) = f(\frac{x}{2}) + 1$.

4. **(3 points)** Consider the quadratic function $f(x) = 2(x - 3)^2 - 1$. Where is its vertex, and would its graph open upwards or downwards?

5. **(4 points)** Express the quadratic $g(x) = 2x^2 + 8x + 11$ in standard form.