More on Functions

Problem Set 7

1. Sketch the following functions and state whether they are an even function, odd function or neither.

   (a) $f(x) = 3x^2 + 4$ (b) $f(x) = x - x^2$ (c) $f(x) = \dfrac{-2}{x}$

2. Find the intervals on which the following functions are increasing and on which they are decreasing. State whether the function in monotonic.

   (a) $g(x) = x^2 - 2x$ (b) $g(x) = 2x + 1$

3. Consider the function $f(x) = \left|x^2 - 2\right|$.

   (a) Sketch $f(x)$ using transformations and modifications on the relevant basic function.

   (b) State the domain and range of $f(x)$.

   (c) Is $f(x)$ an even function, odd function or neither. Give your reasons.

   (d) Use your graph to state the intervals on which $f(x)$ is increasing and on which $f(x)$ is decreasing.

4. Let $f(x) = 2x - 1$, $h(x) = \dfrac{1}{x}$ and $g(x) = x^2 + x$. Find the following composite functions.

   (a) $(g \circ f)(3)$ (d) $(f \circ g)(x)$ (g) $(f \circ f)(x)$

   (b) $(f \circ g)(3)$ (e) $(h \circ g)(x)$ (h) $(f \circ g \circ h)(x)$

   (c) $(g \circ f)(x)$ (f) $(g \circ h)(x)$ (i) $(g \circ h \circ f)(x)$

5. Write $f(x)$ as the composition of two simpler functions.

   (a) $f(x) = (4x + 3)^3$ (c) $f(x) = \dfrac{1}{x^2 - 2}$

   (b) $f(x) = \sqrt{x - 1}$ (d) $f(x) = (5x + 1)^2 - 2$

6. Find the inverse of the following functions.

   (a) $f(x) = 2x - 1$ (b) $f(x) = \dfrac{x^3 - 1}{4}$