

MATH153 - Exercise Sheet 1

February 20, 2019

1. Find the solution set of the following (in)equalities.
 - (a) $|x - 3| + |5 - x| < 1$
 - (b) $|x - 1| + |x - 4| > 2$.
 - (c) $|x^3 + 3x^2 + |3x - 153|| = -8$
 - (d) $|x||x + 2| = 3$
 - (e) $|x^2 - 1| > 9$.
 - (f) $||x - 5| - 1| = 7$
2.
 - (a) Given $f(x) = x + 5$ and $g(x) = x^2 - 3$, find domain of $f \circ g$
 - (b) $f(x) = \frac{5}{x-1}$ and $g(x) = \frac{4}{3x-2}$, find domain of $f \circ g$ and $g \circ f$.
 - (c) $f(x) = \sqrt{x}$ and $g(x) = x^2$, find domain of $f \circ g$ and $g \circ f$.
3. Specify whether the given function is even, odd or neither
 - (a) $f(x) = |x|$ (even)
 - (b) $f(x) = \sin(x + 1)$ (neither)
 - (c) $f(x) = 2x + 1$ (neither)
 - (d) $f(x) = \frac{x}{1-153^x} - \frac{x}{2}$ (even)
 - (e) $f(x) = x\cos(x)$ (odd)
4. Let $f : \mathbb{R} \rightarrow [-1, 1]$ defined as $f(x) = \sin(x + 1)$. Find an even function $g(x)$ and odd function $h(x)$ such that $f(x) = g(x) + h(x)$
5. In the four cases obtained by choosing f even or odd, and g even or odd, determine whether following are even, odd or not necessarily either:
 - (a) $f + g$
 - (b) fg
 - (c) $f \circ g$