

1. Graph the function $f : \mathbb{R} \rightarrow \mathbb{R}$, given by $f(x) = x^3 - 3x$.
2. Let R be an equivalence relation on a non-empty set A , and let $a \in A$. Give the definition for $[a]$, the equivalence class of a under R .
3. Now consider the following equivalence relation R on \mathbb{R} :

$$xRy \iff x^3 - 3x = y^3 - 3y.$$

- (a) Find the equivalence class $[5]$.
 - (b) Find the equivalence class $[0]$.
 - (c) Find all $x \in \mathbb{R}$ such that $[x]$ has exactly 2 elements.
4. Define a new function g on the equivalence classes given by the equivalence relation R by setting $g([x]) = f(x)$.
 - (a) Show that the function g is well-defined, i.e. show the following:

$$\text{If } [x_1] = [x_2], \text{ then } g([x_1]) = g([x_2]).$$

- (b) Show that g is injective.