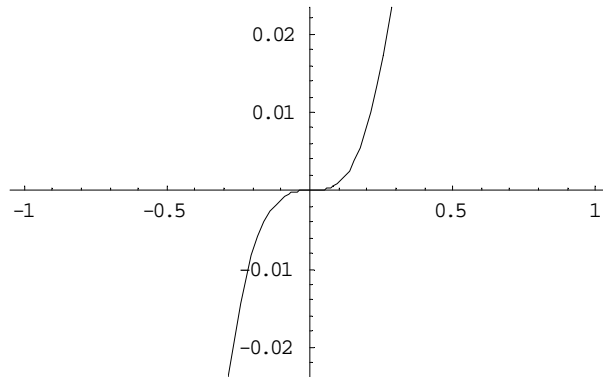


1.2.6 Generate the graph of each of the following functions on \mathbf{R} and use it to determine the range of the function and whether it is onto and one-to-one:

1.2.6.a $f(x) = x^3$

$$F = \{(x, x^3) \mid x \in \mathbf{R}\}:$$

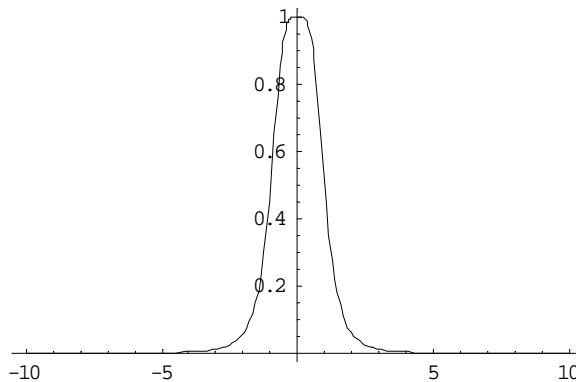


Clearly, the range of this function is all of $\mathbf{R} \Rightarrow f(x) = x^3$ is onto.

Suppose $f(x) = f(x') \Leftrightarrow x^3 = x'^3 \Leftrightarrow \sqrt[3]{x^3} = \sqrt[3]{x'^3} \Leftrightarrow x = x'$. Thus, $f(x)$ is one-to-one.

1.2.6.d $f(x) = \frac{1}{1+x^4}$

$$F = \{(x, \frac{1}{1+x^4}) \mid x \in \mathbf{R}\}:$$



This function is neither one-to-one nor onto.

It is not one-to-one because $f(x) = f(-x)$ i.e. $f(-1) = \frac{1}{2} = f(1)$

It is not onto because $\forall x \in \mathbf{R}$, we have that $f(x) \in (0,1]$