

4. Let $g : \mathbb{R} \rightarrow \mathbb{R}$ be given by $g(x) = x^3 + 7$.

(a) What is the image of 2 under g ?

(b) What is the image of g ? (Write this in set builder notation first, and then make a conjecture as to what that set is.)

(c) Find all the preimages of 6.

(d) True or False: For all $x, y \in \mathbb{R}$, if $x \neq y$, then $g(x) \neq g(y)$. Justify your answer.

5. Define $f : \mathbb{Z} \times \mathbb{Z} \rightarrow \mathbb{Z} \times \mathbb{Z}$ by $f(m, n) = (7 - m, n + m)$.

(a) Calculate $f(2, 3)$, $f(-3, 6)$.

(b) Find all of the preimages of $(5, 0)$.

(c) Find all of the preimages of $(0, 0)$.

(d) True or False: For every $(s, t) \in \mathbb{Z} \times \mathbb{Z}$, there is an $(m, n) \in \mathbb{Z} \times \mathbb{Z}$ such that $f(m, n) = (s, t)$. Justify your answer.

6. If you have time, look at some book problems. 1-7 are all good (but omit part c of problem 1, and part d of problems 2-4).