

MATH 201 SPRING 2021 GRADED HOMEWORK #2

Write clearly, on separate paper. All questions carry equal weight.

- (1) Find the inverse of the function $f: \mathbb{R} \setminus \{1\} \rightarrow \mathbb{R} \setminus \{2\}$ with

$$f(x) = \sqrt[3]{\frac{8x - 7}{x - 1}}.$$

- (2) Prove the following result by induction:

Proposition. Let X be a countable set. Then for all positive integers n , the set

$$\bigcup_{r=1}^n \{(x_1, \dots, x_r) \mid x_1, \dots, x_r \in X\}$$

is countable.

- (3) Prove by induction: $\forall 4 \leq n \in \mathbb{N}, n^2 \leq 2^n$.