



MAT092: Remedial Course in Mathematics

Assessment

January 9, 2026

Total - 20 Marks

Name:

ID:

Section:

1 Sets

1. Let

$$f : \mathbb{R} \longrightarrow \mathbb{R}, \quad f(x) = x^2 - 4x + 3.$$

- Is f **onto** (surjective) as a function from \mathbb{R} to \mathbb{R} ? If not, justify your answer and find the **range** of f .
- Find a restriction of the **codomain** (say $B \subset \mathbb{R}$) such that

$$f : \mathbb{R} \rightarrow B$$

becomes **onto**. Explain why your chosen B works.

- Now restrict both the **domain and codomain** so that f becomes a **bijection**. Find such subsets $A \subset \mathbb{R}$ and $B \subset \mathbb{R}$ and justify your answer with reasoning or a sketch.

(10 Marks)

2. Let

$$A = \{1, 2, 3\}, \quad R = \{(1, 2), (2, 3)\}.$$

3. List all ordered pairs that must be **added** to R to make it **reflexive** on A .

4. List all ordered pairs that must be **added** to R to make it **symmetric**.

5. List all ordered pairs that must be **added** to R to make it **transitive**.

6. Find the **smallest relation** on A that is simultaneously **reflexive, symmetric, and transitive** (i.e. the equivalence closure of R).

Best of Luck!