Quiz 3: Rank & functions

Tuesday, 20th October, 2026

Name: _____

Exercise 1. (4 Points) Calculate the rank of the matrix

$$A = \begin{pmatrix} 1 & 2 & -1 \\ 2 & 5 & 1 \\ 3 & 7 & 0 \end{pmatrix} .$$

Show your working.

Exercise 2. (3+3=6 Points) For each of the following functions, decide whether it is injective and whether it is surjective. Justify your answers.

(i)
$$f\colon \mathbb{R} \longrightarrow \mathbb{R}, \qquad x \longmapsto e^{2x} - 1 .$$

(ii)
$$g\colon \mathbb{R}^2 \longrightarrow \mathbb{R}, \qquad \begin{pmatrix} x_1 \\ x_2 \end{pmatrix} \longmapsto x_1 - 3x_2 .$$