QUIZ 1 (MATH2301, 2025)

Name: _____

UID: U_____

Justifications are not required in any of the questions.

(1) (4 points) Select either true or false in each case.

(a) The power set of the empty set is empty.

☐ True ☐ False .

(b) The I/O relation of the function $f : \mathbf{R} \to \mathbf{R}$ $f(x) = -x$ is symmetric.

☐ True ☐ False .

(2) (3 points) How many surjective functions are there from $\{1,2,3\}$ to $\{4,5\}$?

(3) (3 points) Draw the graph of a relation on $\{1,2,3\}$ that is transitive but not reflexive.

1. Solutions

(1) (a) False. The power set of the empty set is $\{\{\}\}$, which is not empty.

(b) True. If $(x, y) \in R$ then $y = -x$, so $(y, x) \in R$.

(2) Six. There are $2^3 = 8$ functions overall. Of these, the non-surjective ones map everything to 4 or everything to 5. That is, there are only 2 non-surjective functions. So $8 - 2 = 6$ are surjective.

(3) $1 \to 2, 2 \to 3, 1 \to 3$, for example. Or even the empty relation.