Quiz 4

(80') Name_____ PID_____

(12') 1. Prof. Y is thinking about functions to curve the exam grades. The considered domain is [0,100] in order to handle all possible original grades, and the considered co-domain is [0,100] in order to generate curved grades that still comply with the conventional grade range.

(a) The first candidate is $f(x) = \textbf{min}(x+20, 100)$, where the function **min** is defined as

$$\textbf{min}(a, b) = \begin{cases} a, & \text{if } a \leq b; \\ b, & \text{if } a > b. \end{cases}$$

Is $f(x)$ injective? Is $f(x)$ surjective?

Solution: $f(x)$ is not injective and $f(x)$ is not surjective.

(b) The second candidate is $g(x) = 10 \cdot \sqrt{x}$.

Is $g(x)$ injective? Is $g(x)$ surjective?

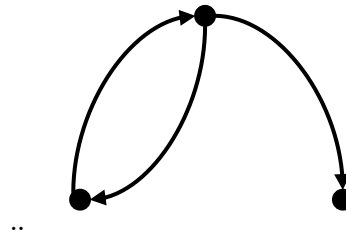**Solution:** $g(x)$ is injective and $g(x)$ is surjective.

(8') 2. We consider binary relations on a single set, and you can sketch your example by directed graphs when applicable.

(a) Is there such a relation that is neither symmetric nor antisymmetric?

If yes, give an example; if no, briefly explain.

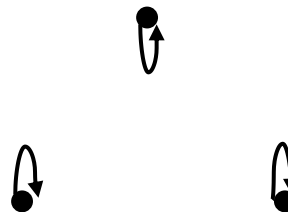**Solution:** Yes.

The example is on the right.

(b) Is there such a relation that is both symmetric and antisymmetric?

If yes, give an example; if no, briefly explain.

Solution: Yes.

The example is on the right.

(Bonus 5') Any comments, suggestions and/or concerns about this course and/or the instructor? (E.g., you prefer more whiteboard or more slides in the lectures?)