Computer Science 2400
Fall 2021
Practice Quiz 3b
Functions

For each yes/no question, circle yes or no.

1. Suppose $h : Z \to Z$ is defined by $h(x) = x - 4$.
   (a) Is $h(x)$ one-to-one? **yes no**
   (b) Is $h(x)$ onto? **yes no**
   (c) Is $h(x)$ a bijection? **yes no**
   (d) Does $h(x)$ have an inverse function? **yes no**
2. Suppose $t : Z \to Z$ is defined by $t(x) = 2x$.
   (a) Is $t(x)$ one-to-one? **yes no**
   (b) Is $t(x)$ onto? **yes no**
   (c) Is $t(x)$ a bijection? **yes no**
   (d) Does $t(x)$ have an inverse function? **yes no**
3. Suppose $s : R \to R$, where R is the set of all real numbers, is defined by $s(x) = x^2$.
   (a) Is $s(x)$ one-to-one? **yes no**
   (b) Is $s(x)$ onto? **yes no**
   (c) Is $s(x)$ a bijection? **yes no**
   (d) Does $s(x)$ have an inverse function? **yes no**
4. Suppose $f(x, y) = 2x + y$, where x and y are real numbers.
   (a) What is the domain of f?
   (b) What is the codomain (or target) of f?

5. Suppose $f(x) = -x + 3$ where x is a real number. What is $f^{-1}(x)$? Give the answer as an expression involving x.

6. Using your answer to the preceding question, show that $f(f^{-1}(x)) = x$ for every real number x.

7. Suppose $f : R^+ \to R^+$, where R^+ is the set of all positive real numbers, is defined by $f(x) = x^2$. What is $f^{-1}(x)$? Give the answer as an expression involving x.

8. Suppose $f(x) = 2x + 1$ and $g(x) = x^2 - x$.

   (a) What is $f \circ g$?

   (b) What is $g \circ f$?