Name and student number:

1. Let $A = \{a, b, c, d\}$, $B = \{a, b, c\}$, and $C = \{s, t, u, v\}$.

   (a) Create a function $f : A \to C$ whose range is the set $\{u, v\}$, or explain why it is not possible to do so. [2]

   (b) Create a function $f : B \to C$ whose range is the entire set C, or explain why it is not possible to do so. [2]

Total: 10 points

2. In each part, you're given sets A and B, and a function $f : A \to B$. Determine which functions are one-to-one.

[1] (a) $A = \{1, 2, 3\}, B = \{1, 2, 3, 4\}$, and $f(1) = 3, f(2) = 2, f(3) = 1$.

[1] (b) $A = B = \{1, 2, 3, 4\}$, and $f(1) = 2, f(2) = 1, f(3) = 2, f(4) = 1$.

[2] (c) $A = B = \mathbb{Z}$, and $f(m) = -m$.

[2] (d) $A = B = \mathbb{N}$, and $f(n) = n - 1$ if n is even, and $f(n) = n + 1$, if n is odd.

Total: 10 points