

1. Let $A = \{1, 2, 3, 4, 5\}$. For each part below, give a codomain B and an arrow diagram (\neq digraph) for f with the specified qualities. Give a 1-sentence explanation in each part. The parts are separate, so answers will vary.

(a) f is a relation from A to B , but not a function

(b) f is a one-to-one function from A to B , but not onto

(c) f is onto B

2. (a) Make up a set of ordered pairs that IS a function from $A = \{a, b, c, d\}$ to A but is NOT onto. Explain in a sentence how you can tell.

(b) Choose a codomain B (use roster-set notation to specify what your set B is), then make up a set of ordered pairs that IS a function from $A = \{a, b, c, d\}$ to B and IS onto, but is NOT one-to-one. Explain in a sentence how you can tell.

3. For each attempted relation, circle the correct response(s):

- Whether the relation is a function or not with the given domain and codomain.
- For those that are functions, whether each is onto or not AND one-to-one or not.

(a) $f : \mathbf{R} \longrightarrow \mathbf{R}$ via $f(x) = \sin x$

Not a function *Function that is : onto* *not onto* *1 - 1* *not 1 - 1*

(b) $f : \mathbf{R} \longrightarrow [-1, 1]$ via $f(x) = \sin x$

Not a function *Function that is : onto* *not onto* *1 - 1* *not 1 - 1*

(c) $f : \mathbf{R} \longrightarrow \mathbf{R}$ via $f(x) =$ an angle whose cosine equals x

Not a function *Function that is : onto* *not onto* *1 - 1* *not 1 - 1*

(d) $f : [-1, 1] \longrightarrow [0, \pi]$ via $f(x) =$ an angle whose cosine equals x

Not a function *Function that is : onto* *not onto* *1 - 1* *not 1 - 1*

(e) $f : \mathbf{R} \longrightarrow \mathbf{R}$ via $f(x) = \tan x$

Not a function *Function that is : onto* *not onto* *1 - 1* *not 1 - 1*

(f) $f : (-\frac{\pi}{2}, \frac{\pi}{2}) \longrightarrow [-1, 1]$ via $f(x) = \tan x$

Not a function *Function that is : onto* *not onto* *1 - 1* *not 1 - 1*

(g) $f : \mathbf{R} \longrightarrow \mathbf{R}$ via $f(x) = e^x$

Not a function *Function that is : onto* *not onto* *1 - 1* *not 1 - 1*

(h) $f : \mathbf{R}^+ \longrightarrow (1, \infty)$ via $f(x) = e^x$

Not a function *Function that is : onto* *not onto* *1 - 1* *not 1 - 1*

(i) $f : \mathbf{R} \longrightarrow \mathbf{R}$ via $f(x) =$ an exponent needed on e to create x as a result

Not a function *Function that is : onto* *not onto* *1 - 1* *not 1 - 1*

(j) $f : [1, \infty) \longrightarrow [0, \infty)$ via $f(x) =$ an exponent needed on e to create x as a result

Not a function *Function that is : onto* *not onto* *1 - 1* *not 1 - 1*