Determine which of the relations f are functions from the set X to the set Y.

a) $X = \{-2, -1, 0, 1, 2\}$, $Y = \{-3, 4, 5\}$ and
$f = \{(-2,-3), (-1,-3), (0,4), (1,5), (2,-3)\}$

a) a Function,
① domain is set X ✓
② if $(x,y), (x,y') \in f$, then $y=y'$ ✓
③ onto y bc range of is Y
④ not one-to-one because $(-2,-3), (-1,-3) \in f$

b) $X = \{-2, -1, 0, 1, 2\}$, $Y = \{-3, 4, 5\}$ and
$f = \{(-2,-3), (1,4), (2,5)\}$

not a Function
① domain is set X ✗

c) $X = Y = \{-3, -1, 0, 2\}$ and
$f = \{(-3,-1), (-3,0), (-1,2), (0,2), (2,-1)\}$

Not a Function
① domain is set X ✓
② if $(x,y), (x,y') \in f$, then $y=y'$ ✗
bc $f(-3) = -1$, $f(-3) = 0 \in f$, $y \neq y'$

- Find each inverse function.

  a) $f(x) = 4x + 2, \ x \in R$

  b) $f(x) = 3 + (1/x), \ x \in R$

a) $f(x) = 4x + 2, \ x \in R$

$f^{-1}(y) = x$

let $y = 4x + 2$

$\frac{y-2}{4} = x$

$f^{-1}(y) = \frac{y-2}{4}$ #

b) $f(x) = 3 + (1/x), \ x \in R$

$f^{-1}(y) = x$

let $y = 3 + (1/x)$

$y - 3 = \frac{1}{x}$

$x = \frac{1}{(y-3)}$

$\therefore f^{-1}(y) = \frac{1}{y-3}$ #

- Let f dan g be functions from the positive integers to the positive integers defined by the equations,

  $f(n) = n^2$, $g(n) = 2^n$

- Find the compositions
  - a) $f \circ f$
  - b) $g \circ g$
  - c) $f \circ g$
  - d) $g \circ f$

$f(n) = n^2$, $g(n) = 2^n$

a) $f \circ f = (n^2)^2 = n^4$

b) $g \circ g = 2^{2^n}$

c) $f \circ g = (2^n)^2 = 2^{2n}$

d) $g \circ f = 2^{(n^2)} = 2^{n^2}$