Graph the relation and connect the points. Then graph the inverse. Identify the domain and range for each relation.

1)

Relation	
x	y
0	2
1	5
5	6
8	9

Inverse	
x	y
2	0
5	1
6	5
9	8

Domain: $0 \le x \le 8$

Range: $2 \le y \le 9$

Domain: $2 \le x \le 9$

Range: $0 \le y \le 8$
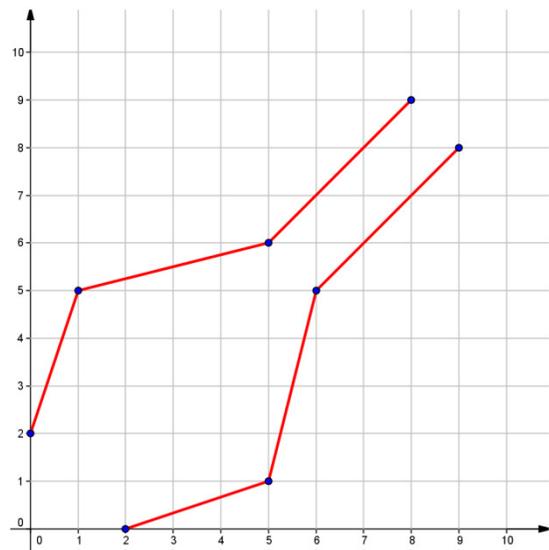
2)

Relation	
x	y
3	−1
4	−2
1	−4
−1	−4

Inverse	
x	y
−1	3
−2	4
−4	1
−4	−1

Domain: $-1 \le x \le 4$

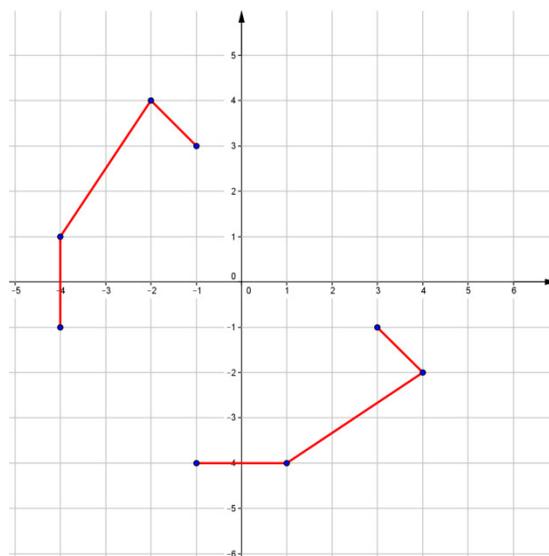Range: $-4 \le y \le -1$

Domain: $-4 \le x \le -1$

Range: $-1 \le y \le 4$

3) Find the inverse of the function. Also find the domain, range, and determine if the inverse is a function.

Function	Domain	Range	Inverse	Is the inverse a function?
$f(x) = \{(1,\ 2),\ (2,\ 2),\ (3,\ 4)\}$	$\{1,\ 2,\ 3\}$	$\{2,\ 4,\}$	$f^{-1}(x) = \{(2,\ 1),\ (2,\ 2),\ (4,\ 3)\}$	No
$f(x) = \{(1,\ 3),\ (2,\ 5),\ (3,\ 7)\}$	$\{1,\ 2,\ 3\}$	$\{3,\ 5,\ 7\}$	$f^{-1}(x) = \{(3,\ 1),\ (5,\ 2),\ (7,\ 3)\}$	Yes

4) A function $g(x)$ has an inverse $g^{-1}(x)$. Find the values of the function and its inverse.

x	$g(x)$
3	4
2	1
8	7

a) $g(2) = \boxed{1}$

b) $g(8) = \boxed{7}$

c) $g(3) = \boxed{4}$

d) $g^{-1}(1) = \boxed{2}$

e) $g^{-1}(4) = \boxed{3}$

f) $g^{-1}(7) = \boxed{8}$

Use inverse operations to write the inverse of each function.

5) $f(x) = 4x$

$$\boxed{f^{-1}(x) = \frac{x}{4}}$$

6) $f(x) = x + 3$

$$\boxed{f^{-1}(x) = x - 3}$$

7) $f(x) = \frac{x}{2} + 3$

$$\boxed{f^{-1}(x) = 2x - 6}$$

8) $f(x) = \frac{1}{2}(3 - 3x)$

$$\boxed{f^{-1}(x) = 1 - \frac{2}{3}x}$$

9) $f(x) = \frac{3x - 5}{2}$

$$\boxed{f^{-1}(x) = \frac{2}{3}x + \frac{5}{3}}$$

10) $f(x) = x^2 + 3$

$$\boxed{f^{-1}(x) = \pm\sqrt{x - 3}}$$

11) $f(x) = 2x^2 + 4$

$$f^{-1}(x) = \pm\sqrt{\dfrac{x-4}{2}}$$
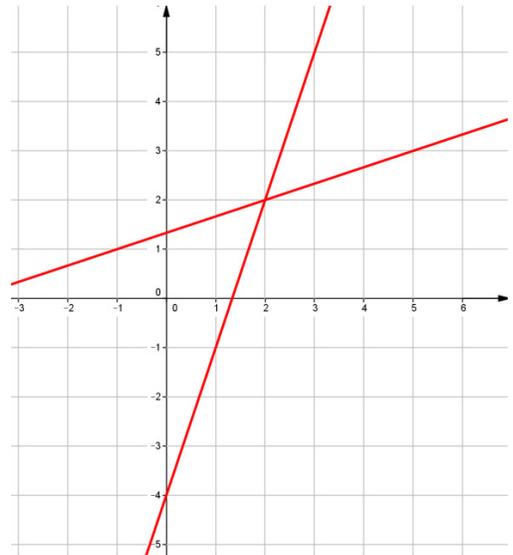
12) $f(x) = \sqrt{2x+3} - 4$

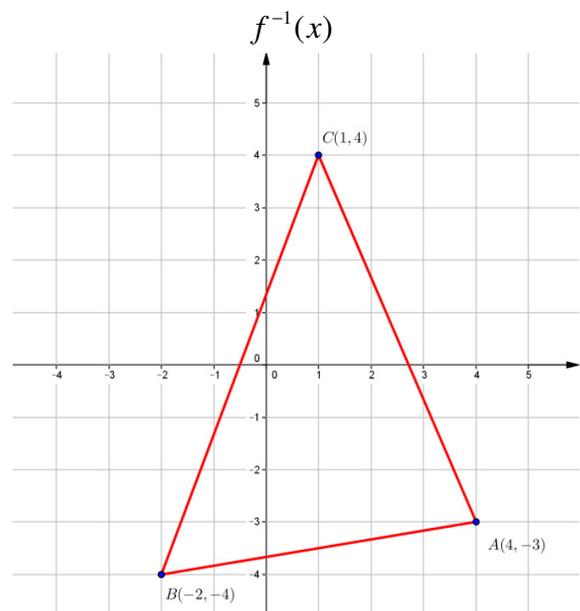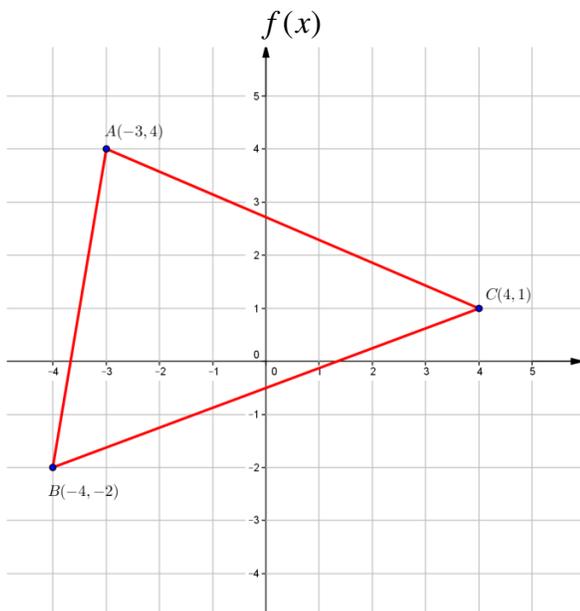$$f^{-1}(x) = \dfrac{(x-4)^2 - 3}{2}$$

13) $f(x) = 3$

$$x = 3$$

14) Graph $f(x) = 3x - 4$. Then write and graph the inverse.

$$f(x) = \dfrac{1}{3}x + \dfrac{4}{3}$$

15) Find the coordinates of the vertices of the inverse for the figure on the left.

$f(x)$

$A(-3, 4)$

$C(4, 1)$

$B(-4, -2)$

$f^{-1}(x)$

$C(1, 4)$

$A(4, -3)$

$B(-2, -4)$

16) A theater sells tickets for $20. If you pay by credit card, the theater adds a service charge of $3.00 to the entire order.

a) Write a function that gives the amount billed C to the credit card as a function of the number n of tickets purchased.

$$\boxed{C = 20n + 3}$$

b) Write the inverse function, and use it to find the number of tickets purchased when the credit card bill is $303.

$$\boxed{n = \frac{C-3}{20}}$$

c) Is it possible to have a total of $213 billed to your credit card for these tickets? Explain.

$$\boxed{\text{No, when } C = 213, \, n \text{ is not an integer.}}$$

Give the inverse of each linear function, where $y = f(x)$.

17) $y = mx + b$

$$\boxed{f^{-1}(x) = \frac{x}{m} - \frac{b}{m}}$$

18) $ax + by = c$

$$\boxed{f^{-1}(x) = -\frac{b}{a}x + \frac{c}{a}}$$

19) $y - y_1 = m(x - x_1)$

$$\boxed{f^{-1}(x) = \frac{x - y_1}{m} + x_1}$$