

p 013 q10

10. The graph of $f(x) = |x|$ is transformed to the graph of $g(x) = f(x - 9) + 5$.
- a) Determine the equation of the function $g(x)$.
 - b) Compare the graph of $g(x)$ to the graph of the base function $f(x)$.
 - c) Determine three points on the graph of $f(x)$. Write the coordinates of the image points if you perform the horizontal translation first and then the vertical translation.
 - d) Using the same original points from part c), write the coordinates of the image points if you perform the vertical translation first and then the horizontal translation.
 - e) What do you notice about the coordinates of the image points from parts c) and d)? Is the order of the translations important?

a) $f(x) = |x|$

$$g(x) = f(x-9) + 5$$

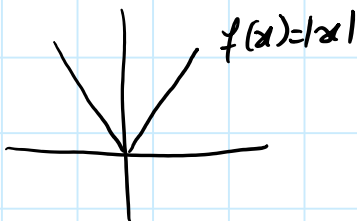
$$g(x) = |x-9| + 5$$

identify this as a shift right by 9 units

shift up by 5

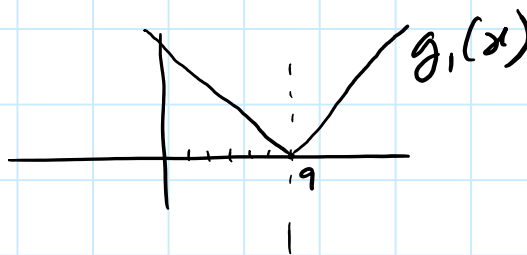
b)

graphs comparison

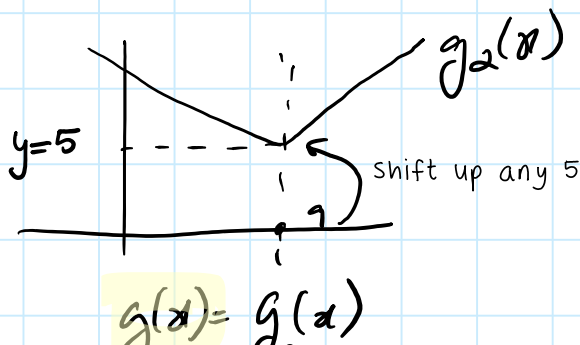


abs val graph

step 1 shift right by 9 units



step 2: shift up by 5 units.



$$g(x) = g_2(x)$$

c) 3 points on the image, i.e. $g(x)$:

$f(x)$: $g(x)$ if **H first then V next**

$$(0,0) \rightarrow H: (0+9,0) \\ V: (9,0+5) = (9,5)$$

$$(1,1) \rightarrow H: (1+9,1) \\ V: (10,1+5) = (10,6)$$

$$(2,2) \rightarrow H: (2+9,2) \\ V: (11,2+5) = (11,7)$$

d) $g(x)$ if **V first then H next**

$$V: (0,0+5) \\ H: (0+9,5) = (9,5)$$

⋮
| the same
| results
(
⋮ as above

e)

when combining only 2 shifts: one that is **horizontal** with one that is **vertical**, the order in that case **does not matter**. This is because these two shifts operate in separate independent dimensions: x and y .