

Function Notation and Transformations

Homework- Nelson Page 70 #s 3, 6, 8c, 9c, 18 & 19

Warm Up

Evaluate/Simplify for $f(x) = x^2$

Answers



a) $f(2)$

$$= (2)^2$$

$$= 4$$

b) $f(3x)$

$$= (3x)^2$$

$$= 9x^2$$

c) $2f(x-1)$

$$= 2[(x-1)^2]$$

$$= 2[x^2 - 2x + 1]$$

$$= 2x^2 - 4x + 2$$

d) $-f(x+1) - 3$

$$= -[(x+1)^2] - 3$$

$$= -[x^2 + 2x + 1] - 3$$

$$= -x^2 - 2x - 1 - 3$$

$$= -x^2 - 2x - 4$$



Function Notations and Transformations



We can tell from function notation what the transformations are without having to evaluate.

For example we would have the following:

$$y = a(k(x-d))^2 + c$$

In function notation we have

$$y = a|k(x-d)| + c$$

$$y = af(k(x-d)) + c$$

$$y = a(k(x-d))^3 + c$$

where,

$f(x)$ could equal x^2 , $|x|$, x^3 , \sqrt{x} , etc

$$y = a\sqrt{k(x-d)} + c$$



Recall



a - vertical stretch/compression and reflection

c - vertical translation (or shift)

k - horizontal stretch/compression and reflection

*** the factor of is $1/k$

d - horizontal translation (or shift) ** change the sign



Sketching

Determine the "vertex" of the graph as well as the reflections. This will give you a good estimate of what the graph looks like.

If there is a horizontal or vertical stretch/compression, adjust the graph appropriately - this **doesn't have to be exact**.



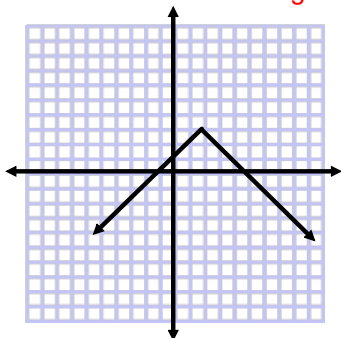
Example

State the transformations and sketch the graph.

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

$$y = -f(x-2) + 3$$

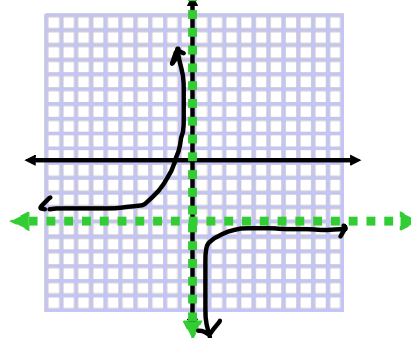
vertical reflection
 vertical translation 3 units up
 horizontal translation 2 units right



b) $f(x) = 1/x$

$$y = f(-x) - 4$$

horizontal reflection
 vertical translation 4 units down



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