

Transformations of Functions

TIPS & TRICKS

#1

Ordering Rules to Live By

shift: left, right, up, down

scale: stretch, shrink, reflect

Horizontal



1. Shift
2. Scale

VS

Vertical



1. Scale
2. Shift

$$f(x) = g(ax + b)$$

1. Scale: $f_1(x) = g(ax)$
2. Shift: $f(x) = f_1(x + b) = g(a(x + b)) = g(ax + ab)$

1. Shift: $f_1(x) = g(x + b)$
2. Scale: $f(x) = f_1(ax) = g((ax) + b) = g(ax + b)$

WHY



$$f(x) = ag(x) + b$$

1. Shift: $f_1(x) = g(x) + b$
2. Scale: $f(x) = af_1(x) = a(g(x) + b) = ag(x) + ab$

1. Scale: $f_1(x) = ag(x)$
2. Shift: $f(x) = f_1(x) + b = (ag(x)) + b = ag(x) + b$

#2

Do's & Don'ts

DO

- transform horizontally, then vertically
- transform vertically, then horizontally
- transform some vertical, then some horizontal, then back to vertical, then back to horizontal--whatever! just...



DON'T

violate #1 ordering rules!!!



#3

Reminders



horizontal transformations are weird

ADD

- b



+ b



MULTIPLY

1/a



a



Quick Note:

scaling transformations can be done in any order!

stretch
shrink
reflect