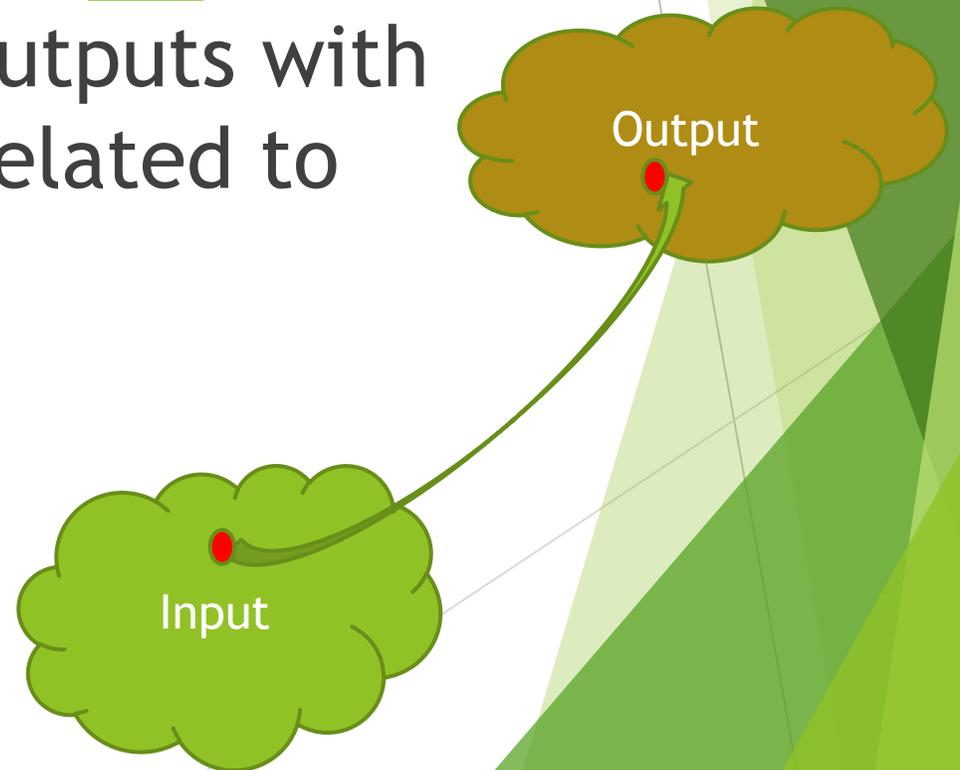


The background features abstract, overlapping geometric shapes in various shades of green, ranging from light lime to dark forest green. The shapes are primarily triangles and polygons, creating a dynamic, layered effect. The central text is positioned in the white space between these green elements.

**FUNCTIONS!!! YOU
REALLY NEED IT**

What is a function

A **function** is a relation between a set of inputs and a set of permissible outputs with the property that each input is related to exactly one output



What is a SET

A set is a well-defined collection of objects.



It is possible to determine if something belongs to the collection or not, without prejudice.



What is a SET

Is the collection of all US
presidents a set?

YES

How many
elements are in this
set?

44

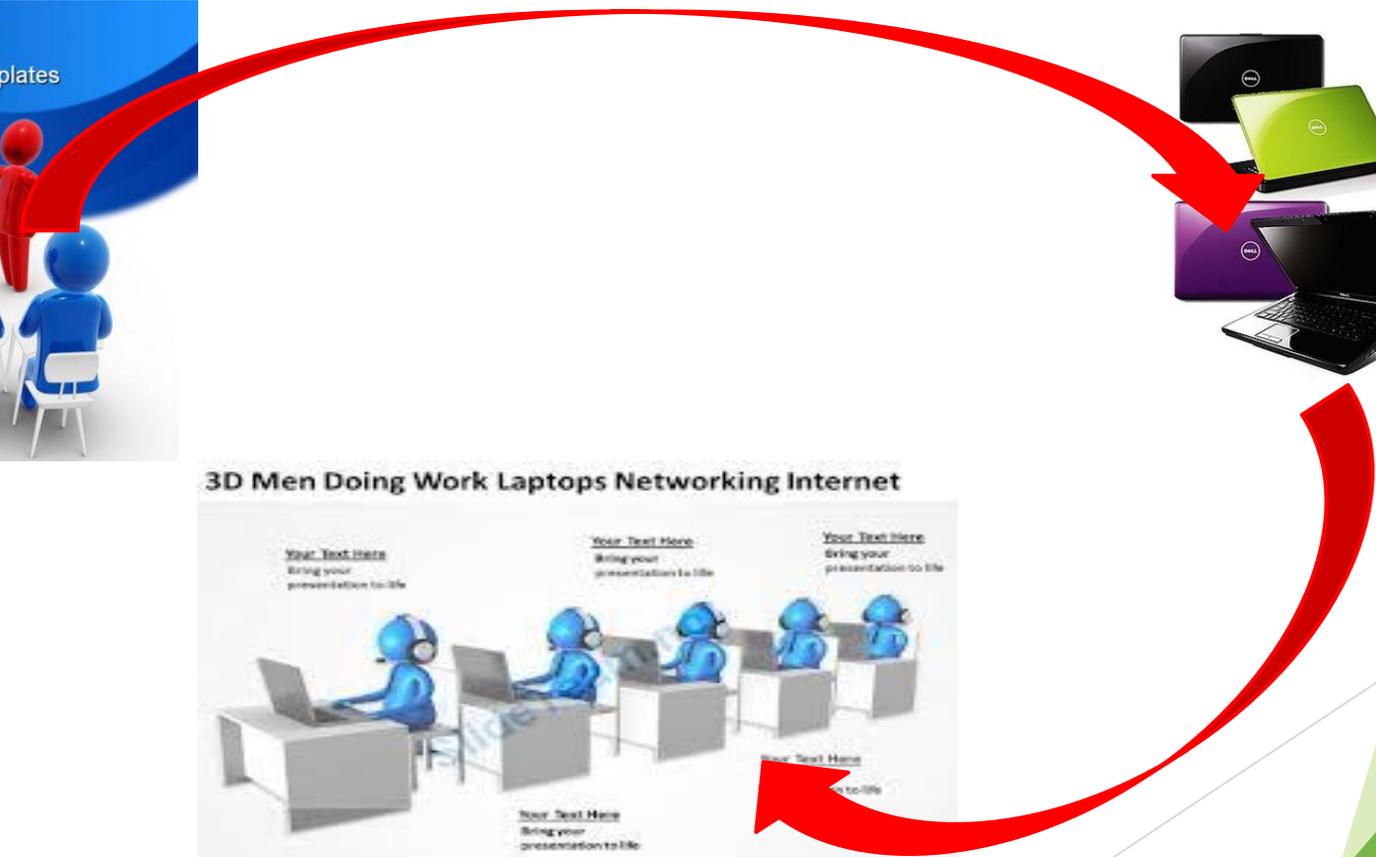


What is a SET

Is the collection of the most beautiful Hollywood actresses a set? **NO**



What is a RELATION



What is a function

The rule that defines which laptop belongs to whom is the **function**

$f(\text{student}) = \text{laptop}$

The students in the group are input

The laptops are output

What is a function

What if one of you forgot to bring a laptop
and share it with a friend?

Is this still a function?

YES



What is a function

What if one of you brought 2 laptops and is using both?

Is this still a function?

NOT



What is a function

Which of the following is a function, if X is input and Y is output

$Y=10X+5$ **YES** For each X there is only one Y

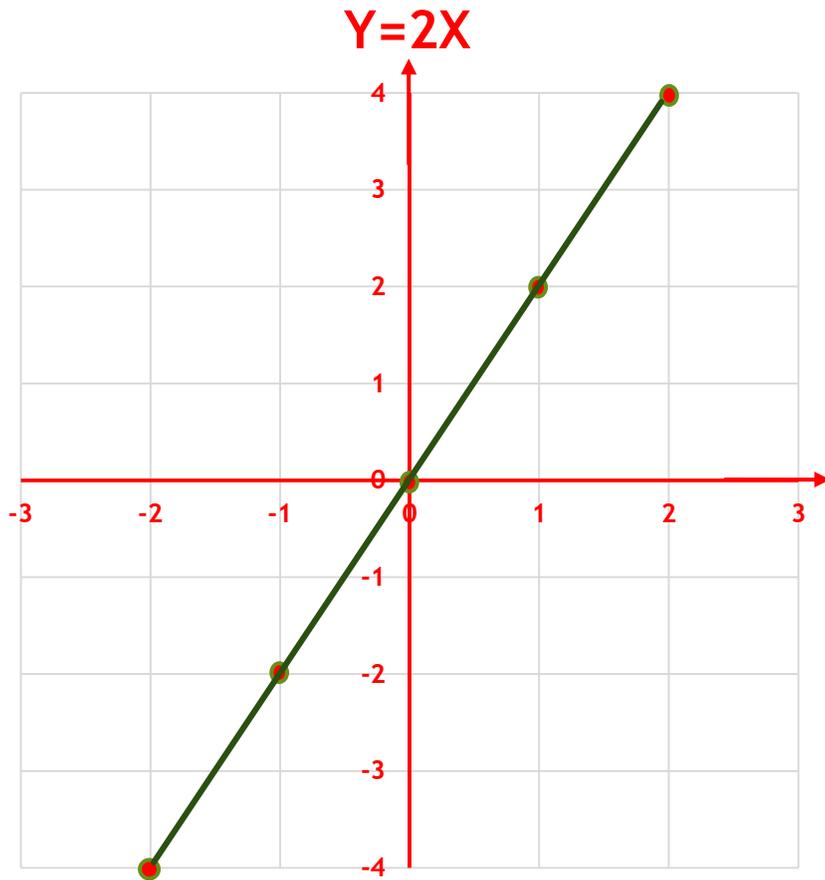
$Y^2=1-X^2$ **NO** $X=0$ $Y=1$ or $Y=-1$

What is a function

The Fundamental Graphing Principle for Functions.

The graph of a function f is the set of points which satisfy the equation $y = f(x)$. That is, the point $(x; y)$ is on the graph of f if and only if $y = f(x)$.

What is a function



$$Y=2X$$

$$X=-2 \quad Y=-4$$

$$X=-1 \quad Y=-2$$

$$X=0 \quad Y=0$$

$$X=1 \quad Y=2$$

$$X=2 \quad Y=4$$

TRANSFORMATIONS

Now let's play with graphs

Suppose you have a graph of $f(x)$ that describes it. Can you find the following functions

$$g(x) = f(x) + a$$

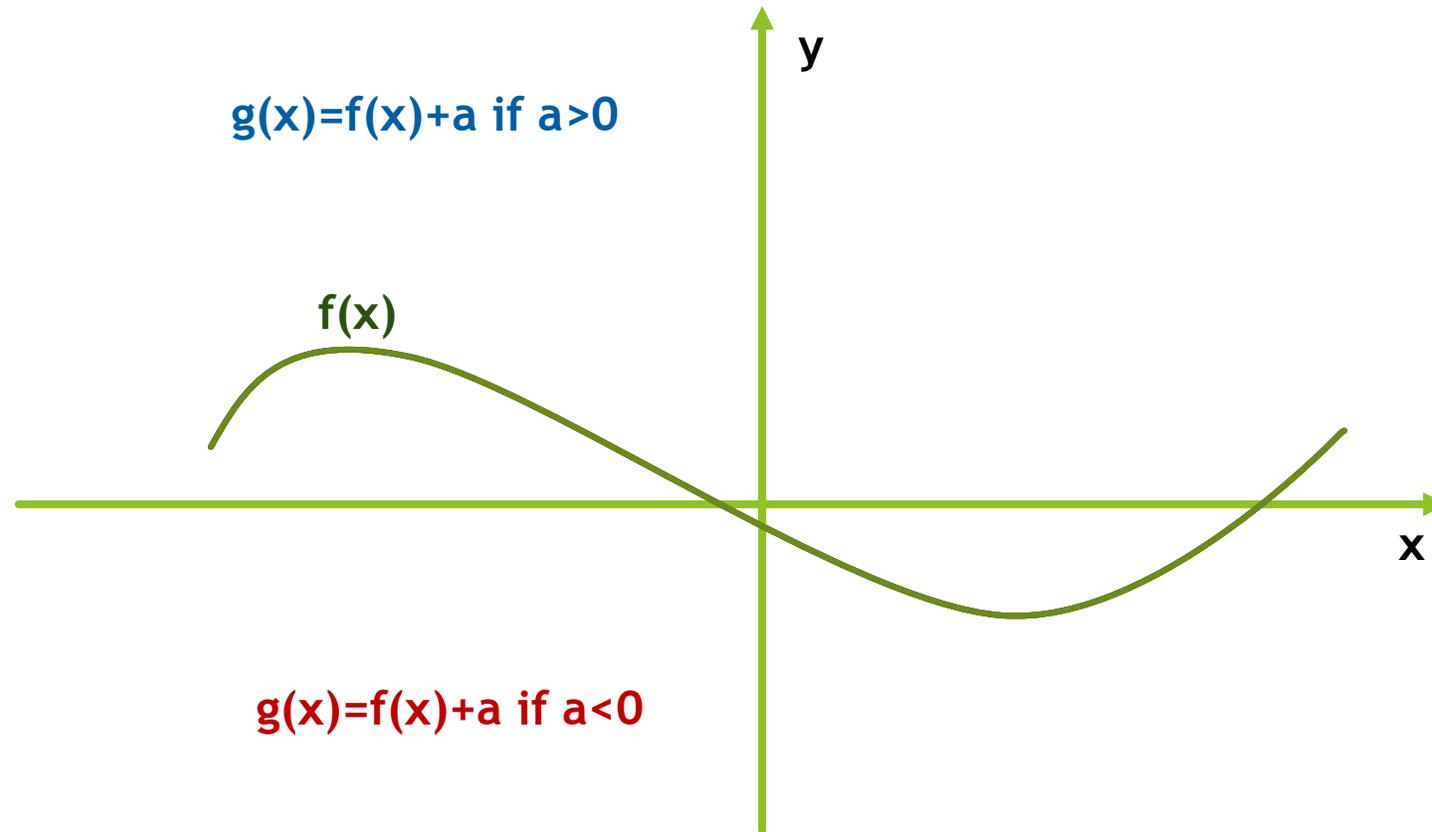
YES

$$g(x) = f(x + a)$$

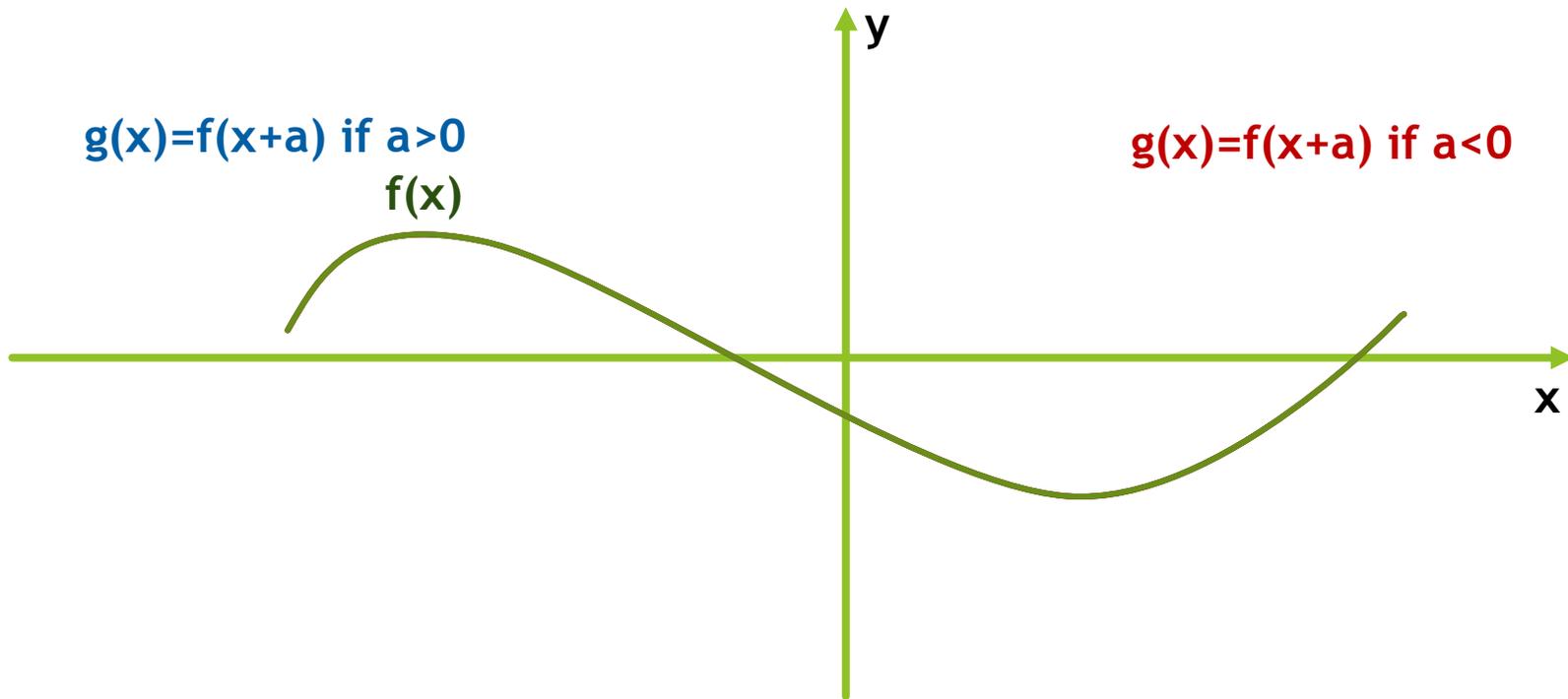
$$g(x) = af(x)$$

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

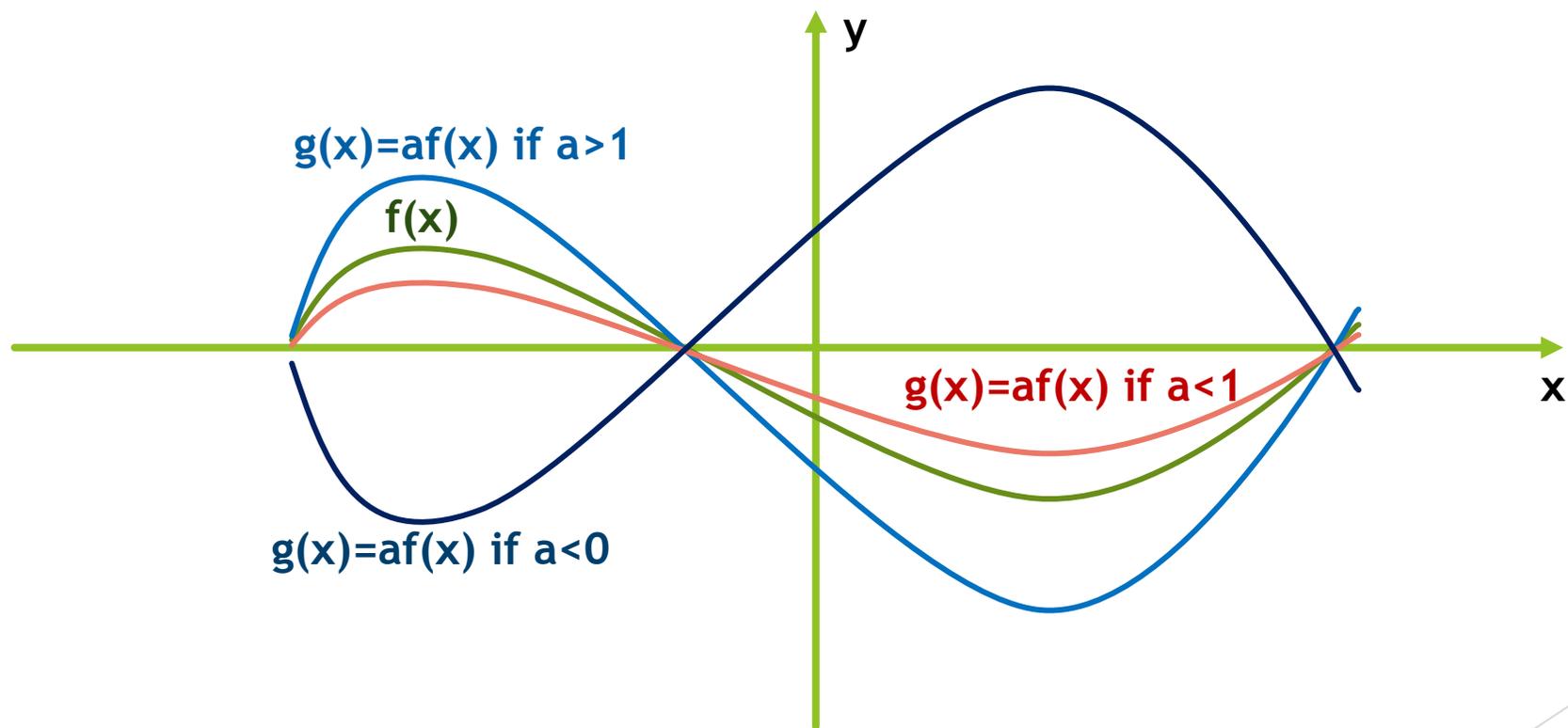
Transformations $g(x)=f(x)+a$



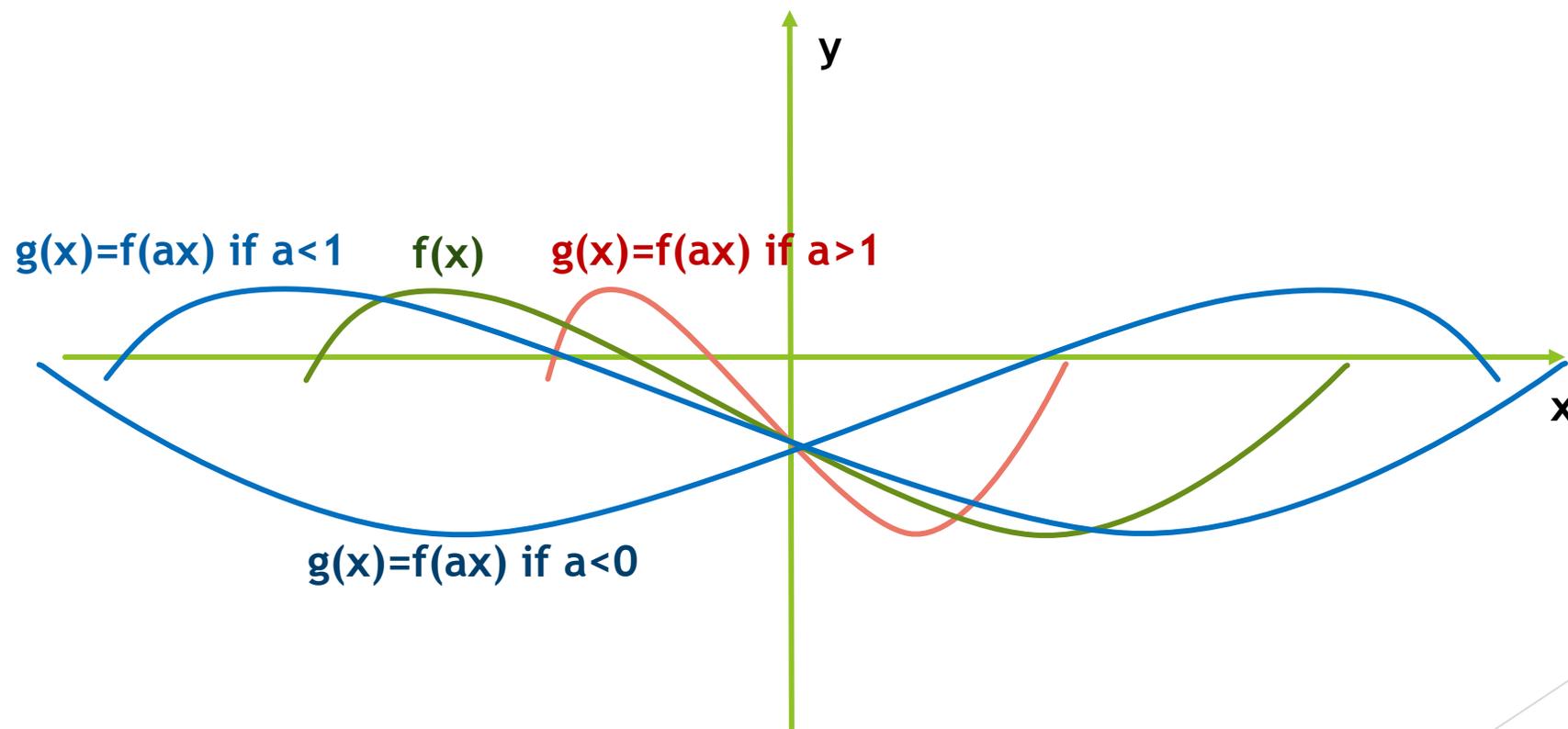
Transformations $g(x)=f(x+a)$



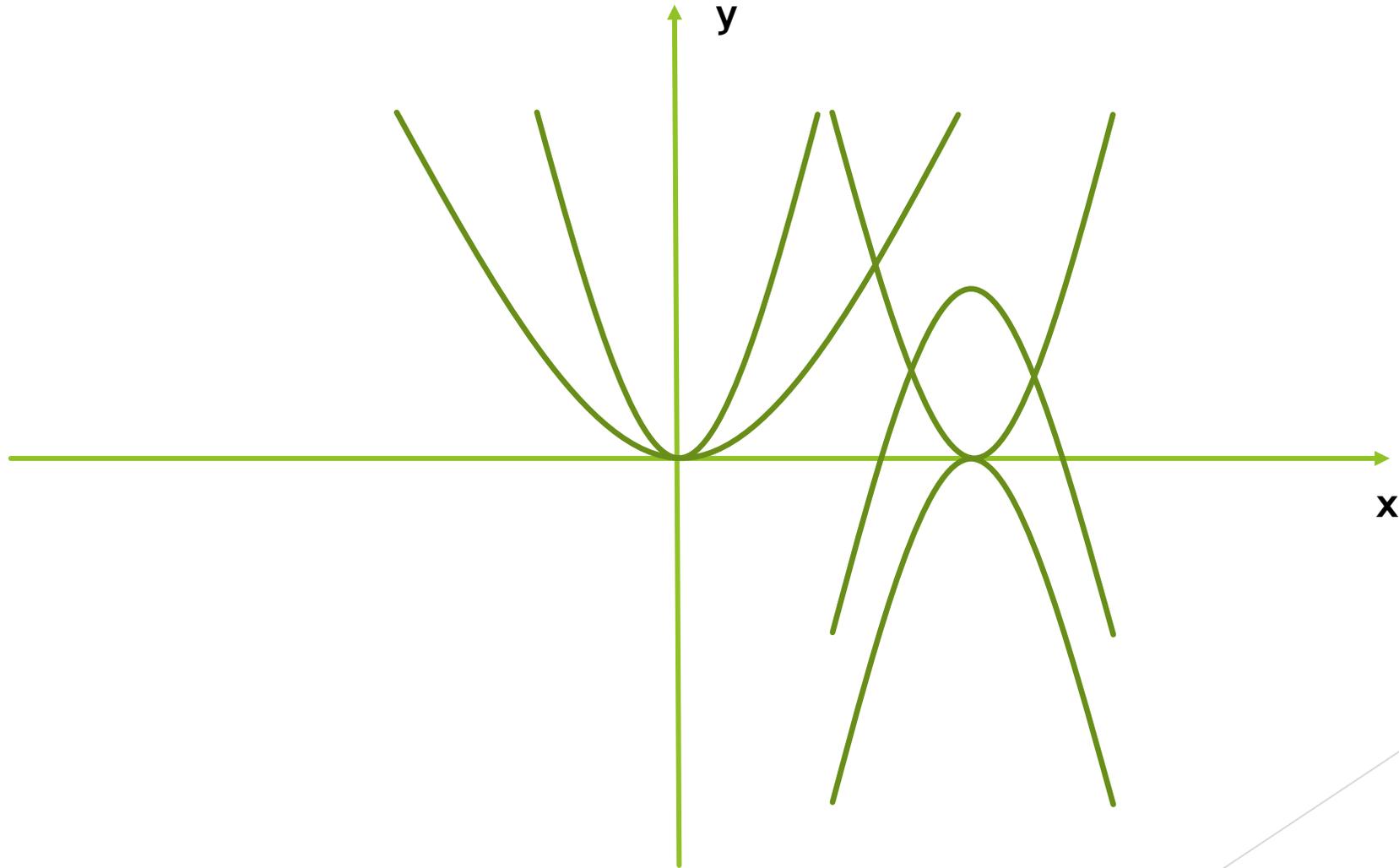
Transformations $g(x)=af(x)$



Transformations $g(x)=f(ax)$



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



THANK YOU

The background features abstract, overlapping geometric shapes in various shades of green, ranging from light lime to dark forest green. These shapes are primarily located on the right side of the image, creating a dynamic, layered effect. The text 'THANK YOU' is centered horizontally and rendered in a bold, green, sans-serif font.