

1-6: Graphical Transformations

Honors Precalculus

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I. Transformations

- A.) Performed on Parent Functions.
- B.) Rigid – SIZE and SHAPE stay the same.
 - Translations
- C.) Non-rigid –Distorted shape
 - Stretches and Compressions

I. Translations

A.) Vertical Translation –

$$y = f(x) \pm c - \text{Up or Down } c \text{ units}$$

B.) Horizontal Translation -

$$y = f(x \pm c) - \text{Left or Right } c \text{ units}$$

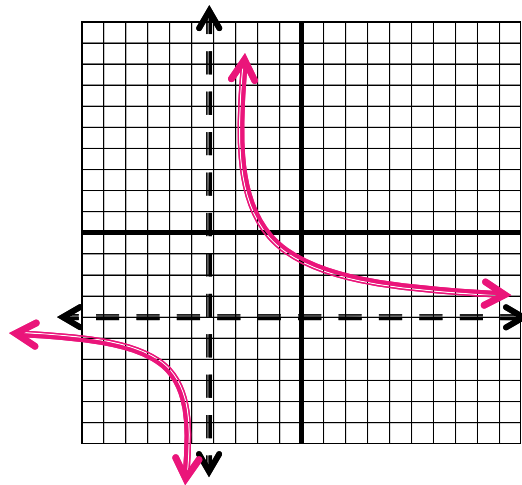
C.) Ex.- Describe the translation of the following

function: $f(x) = e^{x-2} + 4$

Translate $f(x)$ 2 units to the right horizontally
And up 4 units vertically

D.) Ex.- Find the equation of the following
translation of $y = \frac{1}{x}$

$$y = \frac{1}{x+4} - 4$$



III. Reflections

A.) A FLIP of the graph of f over the x -axis or y -axis.

B.) Across the x -axis - $y = -f(x)$

C.) Across the y -axis - $y = f(-x)$

D.) Ex: Find an equation for the reflection of the following function across both axes.

$$f(x) = \ln(x+1)$$

$$f(x) = -\ln(-(x+1))$$

$$f(x) = -\ln(-x-1)$$

IV. Stretches and Shrinks

Let c be a positive real number

A.) Horizontal – $y = f\left(\frac{x}{c}\right)$

1.) A STRETCH by a factor of c if $c > 1$

2.) A SHRINK by a factor of c if $c < 1$

B.) Vertical – $y = cf(x)$

1.) A STRETCH by a factor of c if $c > 1$

2.) A SHRINK by a factor of c if $c < 1$

C.) Ex: Determine the equation for the following stretches/shrinks for the graph of $y = f(x) = \sin x$.

1.) Vert. stretch by 2. $f(x) = 2 \sin x$

2.) Hor. shrink by 2. $f(x) = \sin 2x$

3.) Vert. shrink by 2 $f(x) = \frac{1}{2} \sin x$

4.) Hor. stretch by 2. $f(x) = \sin \frac{x}{2}$

V. Combining Transformations

Ex: Complete the following transformations to the graph of

$$\cdot f(x) = x^2$$

- Reflection over the x -axis. $f(x) = -(x)^2$

- Stretch vertically by a factor of 4. $f(x) = -4x^2$

- Translate vertically by -2 and horizontally by 1.

$$f(x) = -4(x-1)^2 - 2$$