

Transformations of Functions

$$\text{Given: } y = a f \left[k (x - p) \right] + q$$

1
2
3
4

All possible transformation are:

(1) vertical reflection and scaling
(stretch/compress). $y \rightarrow ay$

(2) horizontal reflection and scaling
(stretch/compress). $x \rightarrow \frac{x}{k}$

(3) horizontal shift (left/right). $x \rightarrow x + p$

(4) vertical shift (up/down). $y \rightarrow y + q$

For any single point, the transformations can be summarized as an image point:

$$(x, y) \rightarrow \left(\frac{x}{k} + p, ay + q \right)$$

2
3
1
4

Special features, such as asymptotes, can also be transformed in this way:

vertical asymptote $x = c \rightarrow x = \frac{c}{k} + p$

horizontal asymptote $y = d \rightarrow y = ad + q$

Assigned Work:

p.70 # 4, 6, 10 (describe transformations)

+ p.70 # (7-9)b (sketch/graph using transformations)

+ p.70 # 16-18, 22*