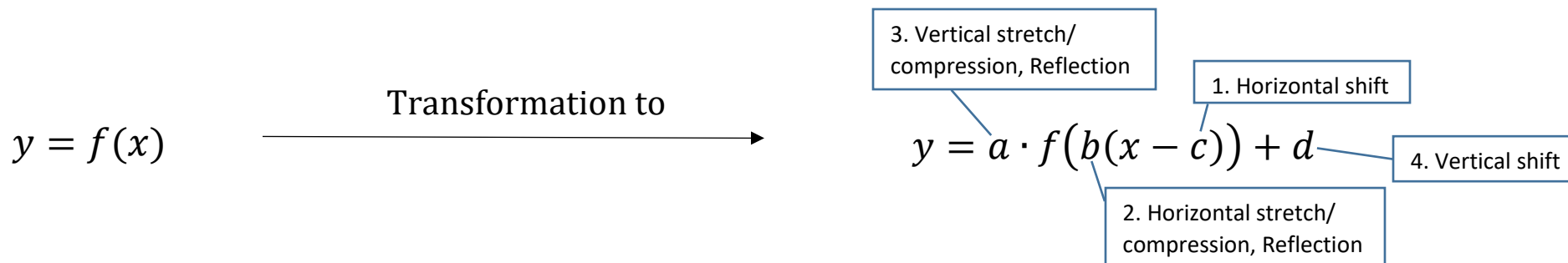


Transformations of the Graphs



Follow the order of operations when we perform transformations.

1. Horizontal Shift

If $c > 0$, it causes horizontal shift to the right c units.

If $c < 0$, it causes horizontal shift to the left $|c|$ units.

2. Horizontal Stretch/Compression, Reflection to the y-axis

If $|b| > 1$, it causes horizontal compression, $|b|$ times much.

If $0 < |b| < 1$, it causes horizontal stretch, $|b|$ times much.

If $b < 0$, it causes reflection to the y-axis.

3. Vertical Stretch/Compression, Reflection to the x-axis

If $|a| > 1$, it causes vertical stretch, $|a|$ times much.

If $0 < |a| < 1$, it causes vertical compression, $|a|$ times much.

If $a < 0$, it causes reflection to the x-axis.

4. Vertical Shift

If $d > 0$, it causes vertical shift, d units up.

If $d < 0$, it causes vertical shift $|d|$ units down.

Ex) Given a graph of $y = x^2$,
sketch a graph of $y = (x - 2)^2 - 1$.

