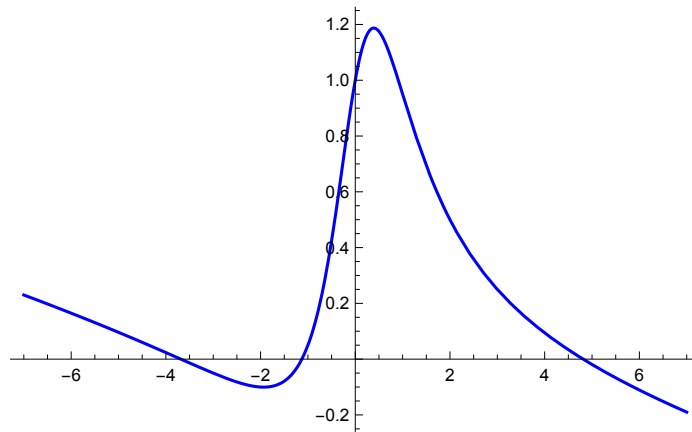# Graphs of absolute values and square roots of non-linear functions
Prapared by Dr Richard Kenderdine
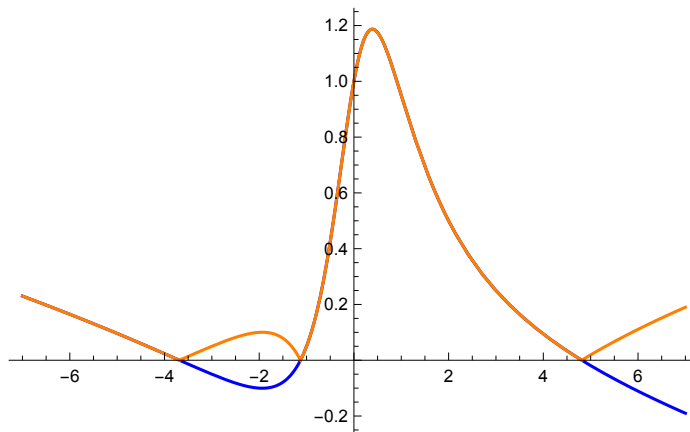## Kenderdine Maths Tutoring

Consider the following function:

Here are some general points for sketching various functions of the above with absolute values and square roots (the new function is shown in orange):

(1) $y = |f(x)|$

Positive values of $f(x)$ remain unchanged. Negative values of $f(x)$ become positive ie are reflected in the x-axis:.
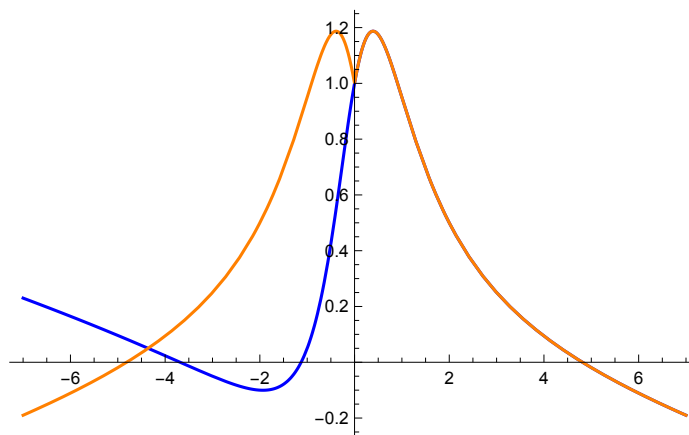
(2) $y = f(|x|)$

The part of the function $f(x)$ to the right of the y-axis (ie with positive x values) remains unaltered.

The part of the function $f(x)$ to the left of the y-axis (ie with negative x values) is eliminated..
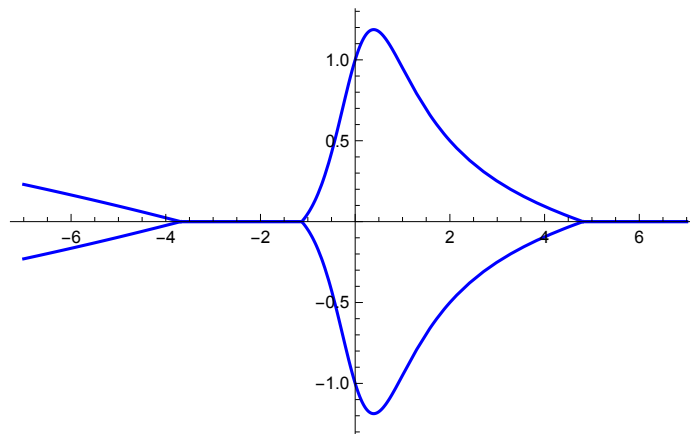
Reflect the part to the right of the y-axis in the y-axis, creating an even function

(3) $|y| = f(x)$

Eliminate any part of $f(x)$ below the x-axis as $|y|$ cannot be negative.

Reflect the remaining part of the function in the x-axis.

(Note that the function appears to be 0 between the two negative x-intercepts and to the right of the positive intercept, This is incorrect, the function does not exist for these x-values).

(4) $y = \sqrt{f(x)}$

Only exists for positive values of $f(x)$. The y values will always be positive.

Horizontal non-zero asymptotes will change.

The square root of numbers between 0 and 1 are larger, they are smaller for numbers greater than 1.
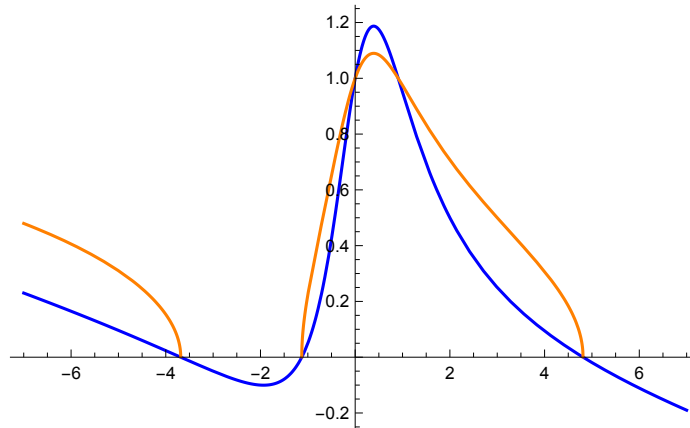
(5) $y^2 = f(x)$

We have $y = \pm \sqrt{f(x)}$ and therefore reflect the function in (4) above in the x-axis.