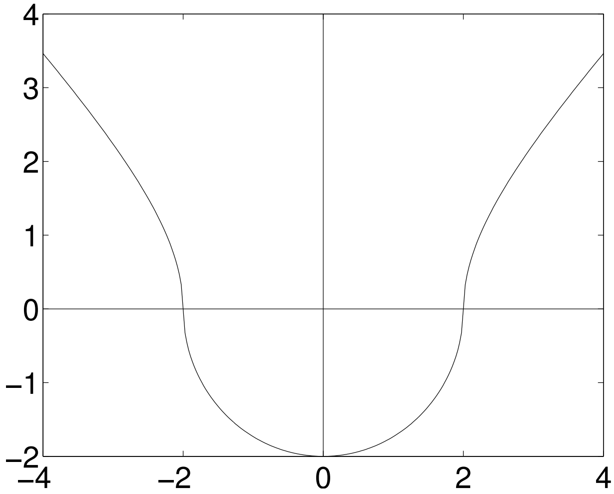
The next example shows how an expert may manipulate decorations explicitly to give a function, defined piecewise by different formulas in different regions of its domain, the best possible decoration. Suppose that

$$f(x) = \begin{cases} f_1(x) := \sqrt{x^2 - 4} & \text{if } |x| > 2, \\ f_2(x) := -\sqrt{4 - x^2} & \text{otherwise,} \end{cases}$$

see the diagram.



The function consists of three pieces, on regions $x \le -2$, $-2 \le x \le 2$ and $x \ge 2$, that join continuously at region boundaries, but the standard gives no way to determine this continuity, at run time or otherwise. For instance, if f is implemented by the `case` *function, the continuity information is lost when evaluating it on, say, $\boldsymbol{x} = [1, 3]$, where both branches contribute for different values of $x \in \boldsymbol{x}$.*

However, a user-defined decorated interval function as defined below provides the best possible decorations.

$$\boxed{\begin{array}{l} \textit{function } \boldsymbol{y}_{dy} = f(\boldsymbol{x}_{dx}) \\ \boldsymbol{u} \ = f_1(\boldsymbol{x} \cap [-\infty, -2]) \\ \boldsymbol{v} \ = f_2(\boldsymbol{x} \cap [-2, 2]) \\ \boldsymbol{w} \ = f_1(\boldsymbol{x} \cap [2, +\infty]) \\ \boldsymbol{y} \ = \texttt{convexHull}(\texttt{convexHull}(\boldsymbol{u}, \boldsymbol{v}), \boldsymbol{w}) \\ dy = dx \end{array}}$$

The user's knowledge that f is everywhere defined and continuous is expressed by the statement $dy = dx$, propagating the input decoration unchanged. f, thus defined, can safely be used within a larger decorated interval evaluation.