

Piecewise defined functions

It is possible to graph piecewise defined functions using the Function applet, although it involves literally splitting the function into pieces.

$$\text{For example: } f(x) = \begin{cases} x+3 & ; x < -2 \\ x^2 - 2 & ; -2 \leq x \leq 1 \\ 3-x & ; x \geq 1 \end{cases}$$

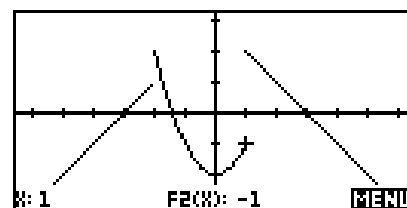
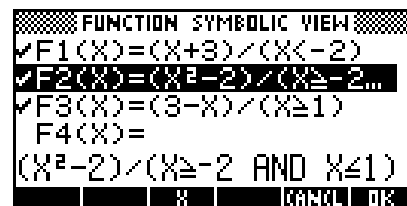
To graph this we need to enter it into the SYMB view as three separate functions:

$$F1(X) = (X+3)/(X < -2)$$

$$F2(X) = (X^2 - 2)/(X \geq -2 \text{ AND } X \leq 1)$$

$$F3(X) = (3-X)/(X \geq 1)$$

Note: The AND function can be found on top of the (-) key.



The reason why this works is that the $(X < -2)$ and the $(X \geq -2 \text{ AND } X \leq 1)$ expressions are evaluated as being either true (which for computers has a value of 1) or false (which has a value of 0).

By dividing by this domain expression we are effectively dividing by 1 inside the range (with no effect) or dividing by zero outside the domain (making the function undefined). This can be seen in the NUM view to the right. Since undefined values are not graphed, this produces the desired effect.

X	F1	F2	F3
-4	-1	UNDEF.	UNDEF.
-3	0	UNDEF.	UNDEF.
-2	UNDEF.	2	UNDEF.
-1	UNDEF.	-1	UNDEF.
0	UNDEF.	-2	UNDEF.
1	UNDEF.	-1	2
4			