1 $f(x)=\frac{x-1}{x^2-1} \xrightarrow{\text{factor}} \frac{x-1}{(x-1)(x+1)} \xrightarrow{\text{cancel off x-1}} \frac{1}{x+1}$

2 Notice that x-1 goes away. The cancellation is valid as long as x is not equal to 1.

3. At x=1, we get $\frac{1-1}{(1-1)(1+1)}=\frac{0}{0\cdot 2}=\frac{0}{0}$ ⇐ which is not defined

4. Around x=1, we get using x=.9: $\frac{0.9-1}{(0.9-1)(0.9+1)}=0.53$

5. Around x=1, we get using 1.1: $\frac{1.1-1}{(1.1-1)(1.1+1)}=0.48$

6. Notice these are very close.

7 We could repeat 4 and 5 above using x=.99 and x=1.01

7 *b*: $\frac{0.99-1}{(0.99-1)(0.99+1)}=0.5025$

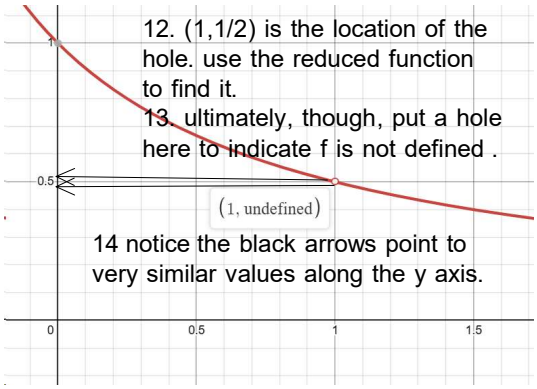
$\frac{1.01-1}{(1.01-1)(1.01+1)}=0.4975$

8 Notice thesevaluesareeven closer together.

9. So at x=1 we have a hole b/c $\frac{0}{0}$ is undefined and the values of y close to the hole are very similar.

10. Remember that the hole, while shown like ∘, is actually just a single missing point that's infinitisemally small, but we can't see it then, so we make it seem bigger than it actually is using ∘.

11 study the image below carefully around x=1 and y=1/(1+1)=1/2(using the reduced version of the function so we can put a point down.



12. (1,1/2) is the location of the hole. use the reduced function to find it.

13. ultimately, though, put a hole here to indicate f is not defined .

14 notice the black arrows point to very similar values along the y axis.