2)

To look identical:

$$\frac{f}{f_1} = \frac{f'}{f_1} \pm k \quad \Leftrightarrow \quad f' = f \pm k f_1$$

$f < \frac{f_1}{2}$, so $0 < f \leq \frac{f_1}{2}$; so you want f' to be in $\frac{f_1}{2} \leq f' \leq f_1$

this happens when $k = 1$

$$\Rightarrow f' = f_1 - f.$$