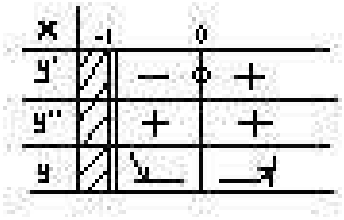
$f''(x) = 0$ is not possible because the quadratic in the numerator has $\sqrt{b^2 - 4ac} = \sqrt{64 - 4(3)8} = \sqrt{-32} < 0$. Like in the first derivative case $f''(x)$ is not defined when $x = -1$ which is not in f's domain.

Sign Chart Here is the sign chart based on the results of the two previous steps.



Graph Here is the graph based on the 6 steps above: