Exercise 3c (Denman-Beaver)

Define the Denman-Beaver algorithm as follows:

$$\begin{cases} x_{k+1} = \frac{1}{2}\left(x_k + \frac{1}{y_k}\right), & x_0 = a > 0 \\ y_{k+1} = \frac{1}{2}\left(y_k + \frac{1}{x_k}\right), & y_0 = 1 \end{cases}$$

$k = 0, 1, 2, \dots$

1) Write a Matlab function file with input a and the maximum number of iterations K.
This iteration can be used as an alternative to Newton-Raphson to solve the equation $f(x) = x^2 - a = 0$.

2) Does it converge? Distinguish between $x_k \to \infty$ and $y_k \to \infty$.

3) Make a plot of the iterations as a function of k.