Given functions

$$F(x,y) = x^2 e^{-x^2} + y^2$$

$$G(x,y) = \frac{x^4}{1+x^2y^2}$$

Now, $F(x^*, y^*) = G(x^*, y^*) = 1$

Here $F(x^*, y^*) = F\{x-(x-x^*), y-(y-y^*)\}$

and $G(x^*, y^*) = G\{x-(x-x^*), y-(y-y^*)\}$

from here, if we can express the system as -

$$x_n = x_{n-1} + \frac{G_y(x_{n-1}, y_{n-1}) - f_y(x_{n-1}, y_{n-1}) + G(x_{n-1}, y_{n-1}) \cdot f_y(x_{n-1}, y_{n-1}) - F(x_{n-1}, y_{n-1}) \cdot G_y(x_{n-1}, y_{n-1})}{F_x(x_{n-1}, y_{n-1}) G_y(x_{n-1}, y_{n-1}) - f_y(x_{n-1}, y_{n-1}) G_x(x_{n-1}, y_{n-1})}$$

and,

$$y_n = y_{n-1} + \frac{f_x(x_{n-1}, y_{n-1}) - G_x(x_{n-1}, y_{n-1}) + F(x_{n-1}, y_{n-1}) G_x(x_{n-1}, y_{n-1}) - f_x(x_{n-1}, y_{n-1}) \cdot G(x_{n-1}, y_{n-1})}{F_x(x_{n-1}, y_{n-1}) G_y(x_{n-1}, y_{n-1}) - f_y(x_{n-1}, y_{n-1}) G_x(x_{n-1}, y_{n-1})}$$

Language: MATLAB

Source code: problem_2.m

Now, final $x_n = x^*$ and $y_n = y^*$

So, from the "Workspace" directory we get.

$$\begin{cases} x^* = 1.173977098108600266775112342294 \\ y^* = 0.807868817139055504812586366049 48 \end{cases}$$

(up to tolerance of "eps")