

$$(5) \quad F(x, y) = (4.27 - x^2 + 0.4y, x)$$

$$F\left(\begin{matrix} 2.3 \\ -1.7 \end{matrix}\right) = \left(\begin{matrix} 4.27 - (2.3)^2 - 0.4(1.7) \\ 2.3 \end{matrix}\right) = \left(\begin{matrix} -1.7 \\ 2.3 \end{matrix}\right).$$

$$F\left(\begin{matrix} -1.7 \\ 2.3 \end{matrix}\right) = \left(\begin{matrix} 4.27 - (-1.7)^2 + 0.4(2.3) \\ -1.7 \end{matrix}\right) = \left(\begin{matrix} 2.3 \\ -1.7 \end{matrix}\right).$$

$$(b) \quad DF_{(x,y)} = \begin{pmatrix} -2x & 0.4 \\ 1 & 0 \end{pmatrix}.$$

$$\begin{aligned} DF_{(2.3, -1.7)} DF_{(-1.7, 2.3)} &= \begin{pmatrix} -4.6 & 0.4 \\ 1 & 0 \end{pmatrix} \begin{pmatrix} 3.4 & 0.4 \\ 1 & 0 \end{pmatrix} \\ &= \begin{pmatrix} -15.24 & -1.84 \\ 3.4 & 0.4 \end{pmatrix}. \end{aligned}$$

$$\lambda^2 + 14.84\lambda + 0.16 = 0. \quad \text{Note } \det DF = -0.4 \\ \text{and } (-0.4)^2 = 0.16$$

Eigenvalues

$$\lambda = \frac{-14.84 \pm \sqrt{219.5856}}{2} = \frac{-14.84 \pm 14.8184}{2}$$

$$= -0.017, -14.83$$

Saddle.