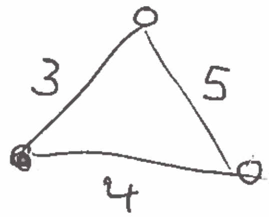
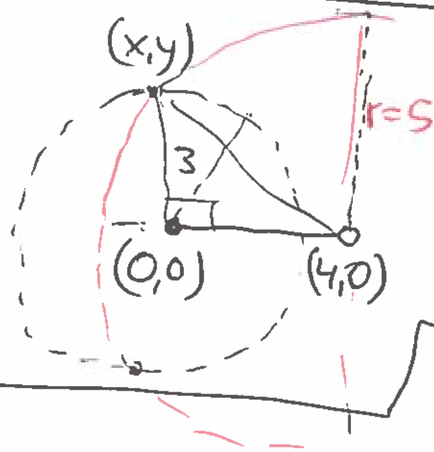
$(A-\lambda I)\, x = 0$

29, 30, 32, 33, 37 39
42 43 (87)

Chapter 4





Jacobian

$$J = \begin{pmatrix} 2x & 2y \\ 2(x-4) & 2y \end{pmatrix} \quad \begin{pmatrix} F_{11} & F_{12} \\ F_{21} & F_{22} \end{pmatrix}$$

$0 = F(x+h) = \ldots \Rightarrow$ [redacted]

$x^+ = x - J^{-1}F$

Find (x,y):

$x^2 + y^2 = 9$

$(x-4)^2 + y^2 = 25$

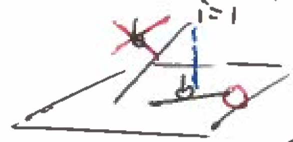
$F: \mathbb{R}^2 \to \mathbb{R}^2$:

$$(x,y) \longmapsto F(x,y) := \begin{pmatrix} x^2+y^2-9 \\ (x-4)^2+y^2-25 \end{pmatrix}$$

Find the roots $(\tilde{x},\tilde{y})$: $F(\tilde{x},\tilde{y}) = \begin{pmatrix} 0 \\ 0 \end{pmatrix}$ zeros

domain range

If b in colum space of A then $Ax = b$ can be solved exactly } yes, because $\exists x$ $b = Ax = \sum_{i=1}^{n} x_i A(:,i)$



$r = b - Ax$

$0 \stackrel{!}{=} A^T r = A^T b - A^T A x$

$[U,S,V] := \text{svd}(A)$ $\quad A = U S V^T$ (s_i, 0)

$A^+ = V S^+ U^T$ ($1/s_i$, 0)

A singular $\Leftrightarrow \exists_{x \neq 0}\, Ax = 0 \qquad Ax = 0 \cdot x$

$0 = f(x) = x^3 - 2x - 5 \qquad x^{i+1} = x^i - \frac{f(x^i)}{f'(x^i)} \qquad 0 \cong f(x+h) = f(x) + h\frac{f'(x)}{1!} + \text{h.o.t.}$

$x^+ = x - \frac{x^3-2x-5}{3x^2-2}$

$h = -f(x)/f'(x)$

$\boxed{f'(x)}\, h = -f(x)$ J

$x^+ = x - \frac{x\sin x - 1}{\sin x + x(\pm)\cos x}$