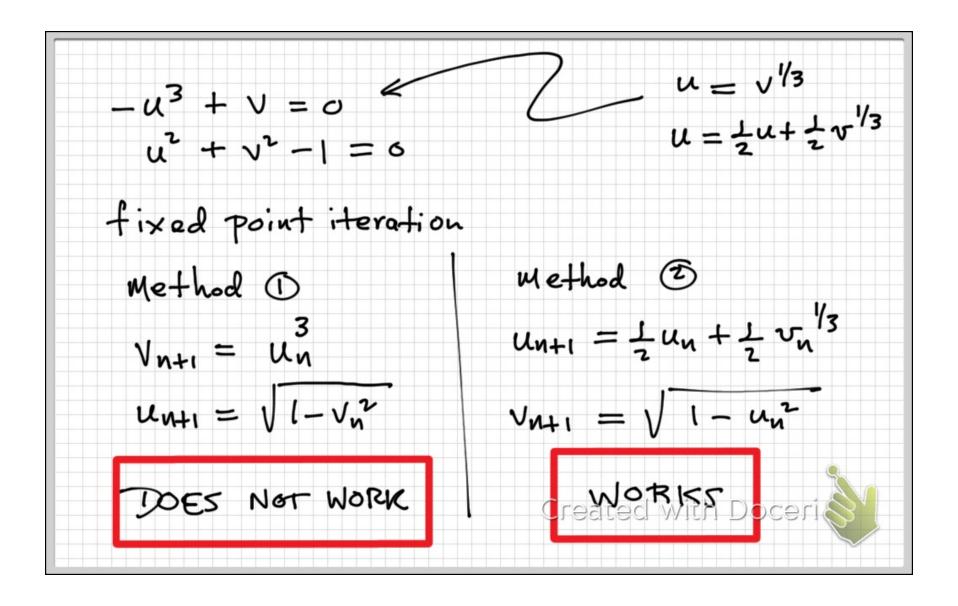
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Root Finding for systems

$$\underbrace{\text{Ex}}_{x} f(\vec{u}) = \begin{pmatrix} -u^{3} + v \\ u^{2} + v^{2} - l \end{pmatrix}, \quad \vec{u} = \begin{pmatrix} u \\ v \end{pmatrix},$$
Solve $f(\vec{u}) = \vec{0}$

$$\begin{aligned}
-u^{3} + v &= 0 \\
u^{2} + v^{2} - l &= 0
\end{aligned}$$
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$$-u^{3} + v = 0 \qquad | \overrightarrow{f}(\overrightarrow{u}) = \overrightarrow{O}, \overrightarrow{u} = \begin{pmatrix} u \\ v \end{pmatrix}$$

$$u^{2} + v^{2} - 1 = 0 \qquad | \overrightarrow{Ov} | = \begin{pmatrix} 3u & Ov \\ Ov & Ov \end{pmatrix} = \begin{pmatrix} -3u^{2} & 1 \\ 2u & 2v \end{pmatrix}$$

$$\frac{\partial f_{2}}{\partial u} \xrightarrow{\partial v} \qquad | \overrightarrow{Ov} | = \langle xu & zv \rangle$$

$$Scalar \quad | \text{Newton:} \quad | \text{Newto$$

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$$\frac{1}{u_{n+1}} = \frac{1}{u_n} - \left[\frac{1}{Df} \left(\frac{1}{u_n} \right) \right]^{-1} f \left(\frac{1}{u_n} \right)$$

$$\frac{1}{u_{n+1}} = \left(\frac{u_n}{v_n} \right) - \left(\frac{3u_n}{2u_n} \right) - \left(\frac{-3u_n}{u_n} \right) - \left(\frac{-u_n}{u_n} + v_n \right)$$

$$\frac{1}{v_n} = \frac{1}{v_n} - \left[\frac{-u_n}{v_n} + v_n \right]$$

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