

Classification of 2D Linear Systems

(a) Eigenvalues $\lambda_1 < 0 < \lambda_2$
Critical point at $(0,0)$ is:
Sketch/example:

(b) Eigenvalues $0 < \lambda_1 < \lambda_2$
Critical point at $(0,0)$ is:
Sketch/example:

(c) Eigenvalues $\lambda_1 < \lambda_2 < 0$
Critical point at $(0,0)$ is:
Sketch/example:

- (d) Eigenvalues $0 < \lambda_1 = \lambda_2$, two linearly independent eigenvectors

Critical point at $(0,0)$ is:

Sketch/example:

- (e) Eigenvalues $0 < \lambda_1 = \lambda_2$, defective

Critical point at $(0,0)$ is:

Sketch/example:

- (f) Eigenvalues $\lambda_1 = \lambda_2 < 0$, two linearly independent eigenvectors

Critical point at $(0,0)$ is:

Sketch/example:

- (g) Eigenvalues $\lambda_1 = \lambda_2 < 0$, defective

Critical point at $(0,0)$ is:

Sketch/example:

(h) Eigenvalues $\lambda_{1,2} = a \pm bi$ where $a > 0$

Critical point at $(0,0)$ is:

Sketch/example:

(i) Eigenvalues $\lambda_{1,2} = a \pm bi$ where $a < 0$

Critical point at $(0,0)$ is:

Sketch/example:

(j) Eigenvalues $\lambda_{1,2} = a \pm bi$ where $a = 0$

Critical point at $(0,0)$ is:

Sketch/example: