$\vec{x}(t) = \phi(\vec{x}, t)$
UNIQUE SOLUTIONS

$\vec{x}^*(t)$ SOLUTION WITH $\vec{x}^*(t_0) = \vec{a}$

$\Downarrow$ $\forall \varepsilon > 0 \ \exists \delta > 0$ ST $\|\vec{x}^*(t_0) - \vec{x}(t_0)\| < \delta \Rightarrow \|\vec{x}^*(t) - \vec{x}(t)\| < \varepsilon \ \forall t \geq t_0$.

$\vec{x}^*(t)$ LIAPUNOV STABLE FOR $t \geq t_0$

$\Downarrow$ δ ABOVE ONLY DEPENDENT ON ε, BUT NOT ON t_0.

$\vec{x}^*(t)$ UNIFORMLY STABLE FOR $t \geq t_0$

$\Downarrow$ $\exists \eta(t_0) > 0$ ST $\|\vec{x}(t_0) - \vec{x}^*(t_0)\| < \eta \Rightarrow \lim_{t \to \infty} \|\vec{x}(t) - \vec{x}^*(t)\| = 0$

$\vec{x}^*(t)$ UNIFORMLY ASYMPTOTICALLY STABLE

$\vec{x}^*(t)$ LIAPUNOV STABLE FOR $t \geq t_0$

$\Downarrow$ $\exists \eta(t_0) > 0$ ST $\|\vec{x}(t_0) - \vec{x}^*(t_0)\| < \eta \Rightarrow \lim_{t \to t_0} \|\vec{x}(t) - \vec{x}^*(t_0)\| = 0$

$\vec{x}^*(t)$ ASYMPTOTICALLY STABLE