Solution to ODE.

1. Classification

1). Equilibrium Sol$^{\underline{n}}$: sol$^{\underline{n}}$ to y when $y'=0$; set $y'=0 \Rightarrow y=C$.

e.g. $\frac{dy}{dt}=(t+1)(y-1)=0 \Rightarrow$ $t=-1$ ✗ or $y=1$.

2). General Sol$^{\underline{n}}$: contains all possible sol$^{\underline{n}}$ to the given ODE; 无数解.
常含有 para. C.).

3). Particular Sol$^{\underline{n}}$: sol$^{\underline{n}}$ to initial value problem; satisfy system $\begin{cases} \text{ODE} \\ \text{point} \end{cases}$
I.V.

2. Integral Curves:

the geometric representation of the general sol$^{\underline{n}}$ is an infinite family of curves; each I.C. is associated with a particular value of para. C.

e.g. ① Verify $y_1(t)=e^{-3t}$ and $y_2(t)=e^t$ is sol$^{\underline{n}}$ to $y''+2y'-3y=0$; ② If add add $y(-\frac{1}{3})=e$, then which one is the sol$^{\underline{n}}$?

①: $y_1'(t)=-3e^{-3t}$; $y_1''(t)=9e^{-3t}$

$\therefore 9e^{-3t}+2\cdot(-3e^{-3t})-3\cdot e^{-3t}=0$ ✓

$y_2'(t)=e^t$; $y_2''(t)=e^t$.

$\therefore e^t+2\cdot e^t-3\cdot e^t=0$ ✓.

②. $y_1(-\frac{1}{3})=e^{-3\cdot -\frac{1}{3}}=e$ ✓

$y_2(-\frac{1}{3})=e^{-\frac{1}{3}}$ ✗.

① Verify: sol$^{\underline{n}}$ 求导后代入.

②. 把 point 代入 sol$^{\underline{n}}$.