

Week 3 summary:

• Linear ODEs: $y'(t) = a(t)y(t) + f(t)$

Homogeneous if additionally, $f(t) = 0$.

• 3 ways to solve linear inhomogeneous ODEs:

(i) Integrating factor: Write as $y' - ay = f$,

int. factor = $e^{-\int a(t) dt}$

"product rule in reverse."

(ii) Variation of parameters: $y(t) = v(t)y_h(t)$, where $y_h(t)$

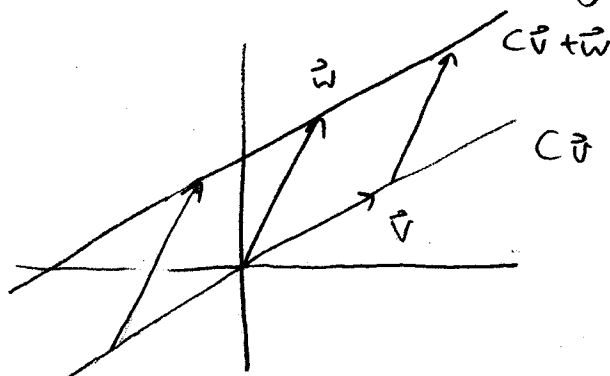
solves the homog. eqn $y_h' = ay_h$.

(iii) $y(t) = y_h(t) + y_p(t)$, for any particular sol'n $y_p(t)$.

• Connection between parametrized lines & solutions of linear ODEs

$y(t) = Cy_h(t) + y_p(t)$

vs. $\ell = C\vec{v} + \vec{w}$



• Mixing problems: $x'(t) = (\text{rate in}) - (\text{rate out})$