Summary: Beam deflection by integration (indeterminate)

FUNDAMENTAL EQUATIONS

differential form	***integral form***
$M(x) = \frac{EI}{\rho} \approx EI\frac{d\theta}{dx}$	$\theta(x) = \theta(x_1) + \frac{1}{EI}\int_{x_1}^{x} M(s)\,ds$
$tan\theta \approx \theta = \frac{dv}{dx}$	$v(x) = v(x_1) + \int_{x_1}^{x} \theta(s)\,ds$

METHOD

- Draw FBD of entire structure and write down equilibrium equations in terms of reactions.
- Divide beam into sections based on changes in supports or loadings.
- For each section:
  - Make cut through section, and determine *M(x)*.
  - Integrate *M(x)/EI* to find θ*(x)*.
  - Integrate θ*(x)* to find *v(x)*.
  - Enforce boundary conditions on θ and *v*.
  - Match θ and *v* across boundaries of sections.
- Solve for unknown reactions using boundary conditions and equilibrium equations.

specific to indeterminate beams