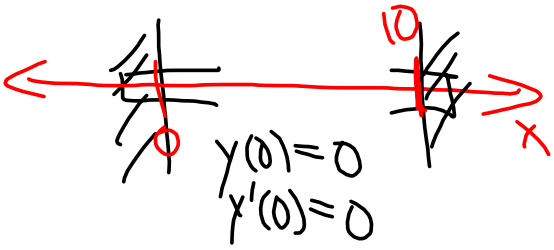
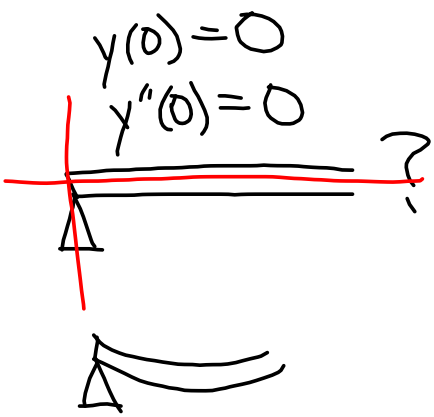
Horizontal Beams

$\frac{d^4x}{dx^4} = \frac{w(x)}{EI}$

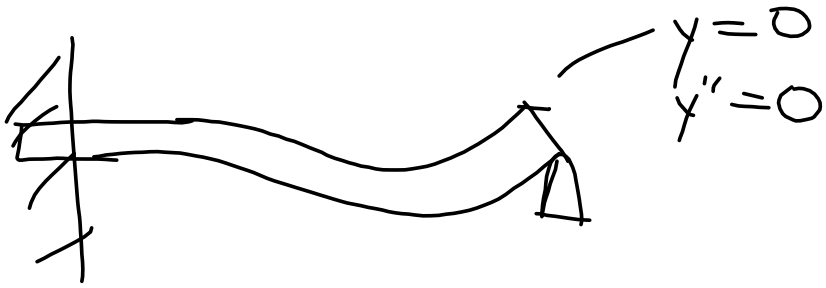
* ODE $\frac{d^4y}{dx^4} = 10$, 4 boundary conditions

* Know BCs.






Free
y''(L)=0
y'''(L)=0

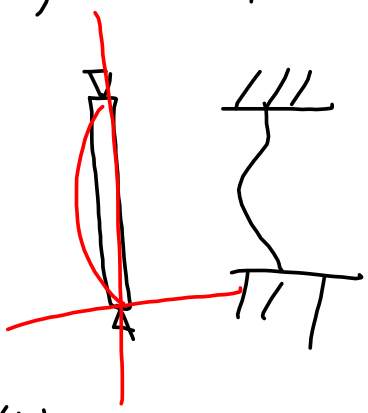

y = 0
y'' = 0

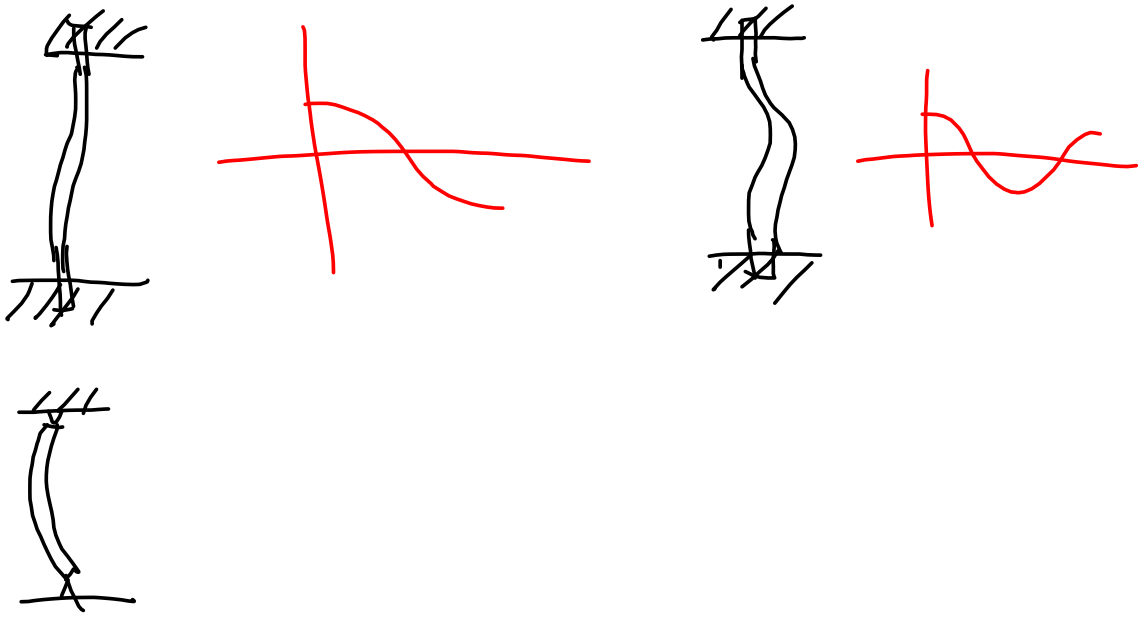
$y'' + \frac{1}{4}y = 0$ $y'' + \lambda^2 y = 0$ $y'' + \frac{P}{10{,}000}y = 0$

$y(0) = 0$, $y(8) = 0$

$y = C_1 \sin\frac{\sqrt{P}}{100}x + C_2 \cos\frac{\sqrt{P}}{100}x$

$y = C_1 \sin\frac{\sqrt{P}}{100}x$ because $y(0) = 0$





$y'' + 2y' + y = 0$

$y = e^{-t}$

Do red of order, get $y = te^{-t}$ as second solution

$$x^2y'' - xy' + y = 0$$

Guess $y = x^p$

$y' = px^{p-1}$

$x^p(p^2 - 2p + 1) = 0$

$y = x$

$y' = 1$

$y'' = 0$

Assume $y = ux$

$$F(s) = \int_0^\infty f(t) e^{-st} dt$$

$$= \int_0^\infty e^{-st} \sin 3t \, dt$$

$$f'(x) = \lim_{h \to 0} \frac{f(x+h) - f(x)}{h}$$

$\frac{d}{dx}$ →

← $\int dx$

$$\int \sin 3x\,dx = -\frac{1}{3}\int -3\sin 3x\,dx$$

$$= -\frac{1}{3}\cos 3x$$

$$\int (\sin 3x + x^2)\,dx$$

$e^{-5t} \xrightarrow{L.T.} \frac{1}{s-(-5)} = \frac{1}{s+5}$

$e^{-2t} \xleftarrow{\mathcal{L}^{-1}} \frac{1}{s+2} = \frac{1}{s-(-2)}$