Remarks on T8

Q1

$$\frac{d^4 y}{dx^4} = \frac{-W(x)}{EI}$$

where W(x) is weight (load**)** **per unit length** of the beam downward direction

By given, weight=0, except at the point x=A.

NOTE THAT weight=0, NOT weight per unit length=0

Weight over very small interval [A-τ, A+τ] is W(A)2τ

Weight at the point A= $\lim_{\tau \to 0} W(A)2\tau$

By given, weight at the point A =Mg

Hence

$$\lim_{\tau \to 0} W(A) 2\tau = Mg$$

We can use Dirac delta function δ(x-A) to represent W(x) (=weight **per unit length** **),**
where W(x)=0 when x≠A , and **weight=1 unit at x=A**

Therefore, Mg δ(x-A) represent

W(x) (=weight **per unit length** **)**
where W(x)=0 when x≠A , and **weight=Mg at x=A**

Hence we have

$$\frac{d^4 y}{dx^4} = \frac{-Mg\delta(x-A)}{EA}$$

We need to use Laplace transform to solve the above ODE

Note that

$$L\left(\frac{d^4 y}{dx^4}\right) = s^4 L(y) - s^3 y(0) - s^2 y'(0) - sy''(0) - y'''(0)$$

We know that

$$y(0)=0, y'(0)=0, y''(L)=0, Y'''(L)=0$$

However we don't need $y''(L), y'''(L)$

We need $y''(0), y'''(0)$ which are given in Q1

Q2

$$V(t) = RI(t) + L\frac{dI(t)}{dt} + \frac{1}{C}\int_0^t I(x)dx$$

“switch the gadget on and off at t=0,
thus firing a short burst of voltage “ means

$$V(t) = A\delta(t)$$

where A is unknown