

[ **Elongation of constant-stress column**

[ > **restart;**

[ incremental extension:

[ > **d\_delta:=(P+W(y))/(A(y)\*E);**

$$d\_delta := \frac{P + W(y)}{A(y) E}$$

[ weight at height y:

[ > **W:=y -> int(rho\*g\*A(xi),xi=0..y);**

$$W := y \rightarrow \int_0^y \rho g A(\xi) d\xi$$

[ area as function of y:

[ > **A:=y -> Pi\*r(y)^2;**

$$A := y \rightarrow \pi r(y)^2$$

[ radius as function of y (from Prob. 1.10):

[ > **r:=y -> r\_0\*exp(Pi\*rho\*g\*r\_0^2\*y/(2\*P));**

$$r := y \rightarrow r_0 e^{\left( \frac{1}{2} \frac{\pi \rho g r_0^2 y}{P} \right)}$$

[ final result: integrate incremental extension of height of column:

[ > **'delta'=simplify(int(d\_delta,y=0..L));**

$$\delta = \frac{LP}{\pi r_0^2 E}$$