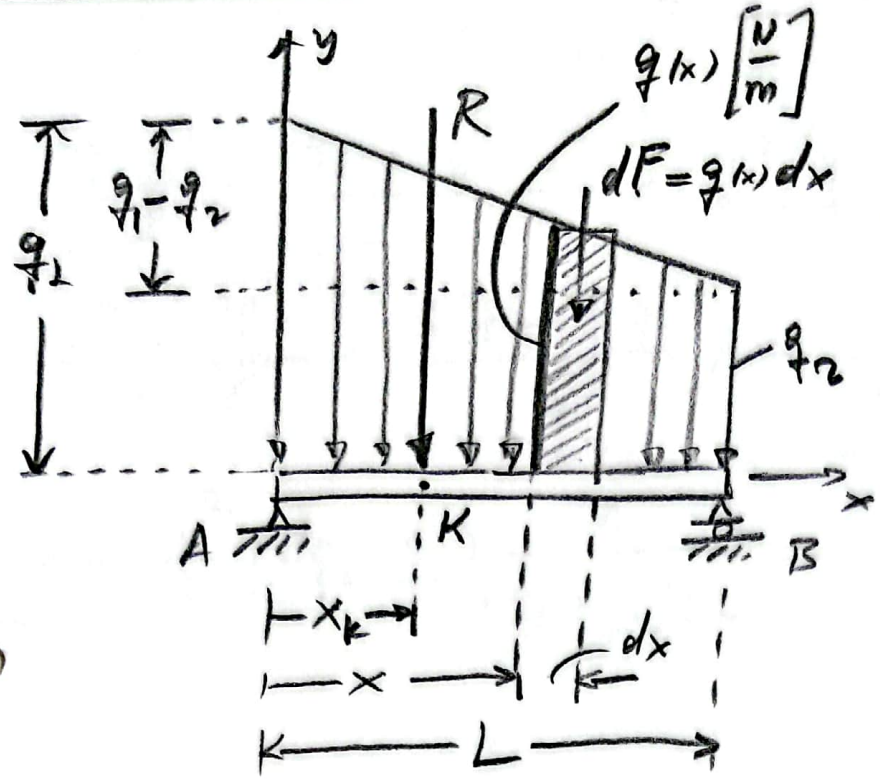
ΑΣΚΗΣΗ 4-2



Συνισταμένη τραπεζο-
-ειδούς φορτίου

Όμοια τρίγωνα:

$$\frac{q(x)-q_2}{L-x} = \frac{q_1-q_2}{L}$$

$\Rightarrow$

$$q(x) = \frac{q_1-q_2}{L}(L-x) + q_2 = q_1\frac{L-x}{L} \cancel{-q_2} + q_2\frac{x}{L} \cancel{+q_2}$$

$$\boxed{q(x) = q_1 + \frac{q_2-q_1}{L}x}$$

Θεωρία

$$R = \int_0^L q(x)\,dx = q_1 L + \frac{q_2-q_1}{L}\left[\frac{x^2}{2}\right]_0^L =$$

$$= q_1 L + \frac{q_2-q_1}{\cancel{L}}\frac{L^{\cancel{2}}}{2} = \boxed{\frac{q_1+q_2}{2}L}$$

Θεωρία

$$\boxed{x_k = \frac{\int_0^L x\,q(x)\,dx}{\int_0^L q(x)\,dx}} \qquad \left(\int_0^L q(x)\,dx = R = \frac{q_1+q_2}{2}L\right)$$

$$\int_0^L x\,q(x)\,dx = \int_0^L \left(q_1 x + \frac{q_2-q_1}{L}x^2\right)dx \Rightarrow$$

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$$\rightarrow \int_0^L x\,q(x)\,dx = q_1\left[\frac{x^2}{2}\right]_0^L + \frac{q_2-q_1}{L}\left[\frac{x^3}{3}\right]_0^L =$$

$$= q_1\frac{L^2}{2} + \frac{q_2-q_1}{L}\frac{L^2}{3} = L^2\left(\frac{q_1}{2}+\frac{q_2}{3}-\frac{q_1}{3}\right) =$$

$$= L^2\left(\frac{2q_2}{6}+\frac{3q_1-2q_1}{6}\right) = \frac{L^2}{6}(2q_2+q_1)$$

$$\boxed{x_k = \frac{L^2}{6}(2q_2+q_1)\frac{2}{(q_1+q_2)L} = \frac{q_1+2q_2}{q_1+q_2}\frac{L}{3}}$$

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