

HOMEWORK 3**Assigned 09/11/25****Due 09/18/25, before class**

Solve the following problem using **two linear elements**. Set each element to span 1 m, so that the nodes are located at global coordinates $x = 0$, $x = 1$, and $x = 2$. Integrate the stiffness matrices for both, then combine them together to create the global stiffness matrices using gather matrices. Repeat the same process for the force vectors given $b(x)$. Reduce the system of equations using the fixed point at $x = 0$, add then boundary condition at $x = 2$, and solve for the resulting displacements at $x = 1$ and $x = 2$.

$$[w]_e^{eT} \int_e [B]^{eT} AE [B]^e dx [d]^e = [w]_e^{eT} [N]^{eT} AE \left. \frac{du}{dx} \right|_e + [w]_e^{eT} \int_e [N]^{eT} b(x) dx$$

$$A = 0.5 m^2$$

$$E = 200 GPa$$

$$b(x) = 10,000 N$$

$$u(0) = 0 m$$

$$E \frac{du}{dx}(2) = \sigma(2) = 10,000 Pa$$