編號： 122　系所：土木工程學系甲組　　科目：材料力學

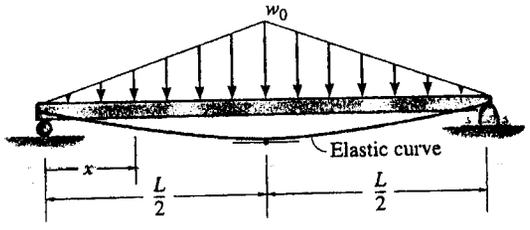
本試題是否可以使用計算機：☑可使用 ，□不可使用 （請命題老師勾選）

1. Make the reasonable assumptions; derive the differential equation of deflection of Bernoulli-Euler beams.

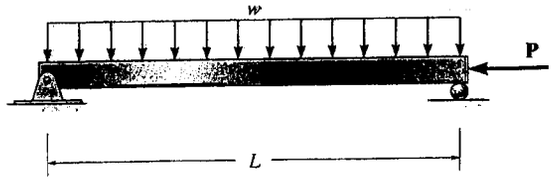
$$\frac{d^2}{dx^2}(EI\frac{d^2v}{dx^2}) = q(x)$$

where E = the material's modulus of elasticity, I = the moment of inertia, v = the deflection of beam, q(x) = the distributed load. **(20%)**

2. The simply supported beam with rectangular cross section supports the triangular distributed loading. The width of cross section is b, and height is h. EI is constant. (1) Plot the shear force and moment diagrams. **(10%)** (2) Find the maximum bending stress σ_{max}, and maximum shear stress τ_{max} induced by the shear force. **(10%)** (3) Find the maximum deflection v_{max}. **(10%)**



3. The ideal column has a weight w (force/length) and rests in the horizontal position when it is subjected to the axial load P. EI is constant. (1) Find the maximum deflection v_{max}. **(15%)** (2) Find the maximum moment in the column M_{max}. **(10%)**



4. The state of strain at point A on the bracket in Figure (a) is measured using the strain rosette shown in Figure (b). The readings from the gages give $\varepsilon_a = 60(10^{-6})$, $\varepsilon_b = 135(10^{-6})$, and $\varepsilon_c = 264(10^{-6})$. The material's modulus of elasticity E = 200 GPa, and Poisson's ratio $\nu = 0.3$. (1) Determine the in-plane principal strains at the point and the directions in which they act. **(15%)** (2) Determine the principal stresses at point A. **(10%)**