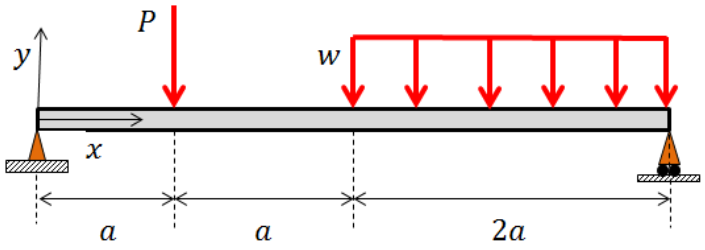
AE323 – Homework Assignment #2 – Spring 2019
Wednesday, Jan. 30, 2019
Due on Friday, Feb. 8 at class time

Topics: Internal Forces and Moments in Statically Determinate Structures

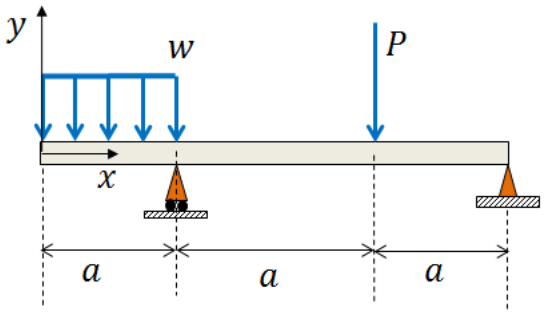
For the three structural problems shown below, answer the following three questions:

a) Is the problem statically determinate or indeterminate, and why?
b) Compute the reactions at the supports
c) Find the expression of the resultant shear force $V_y(x)$ and bending moment $M_z(x)$ in the beam.

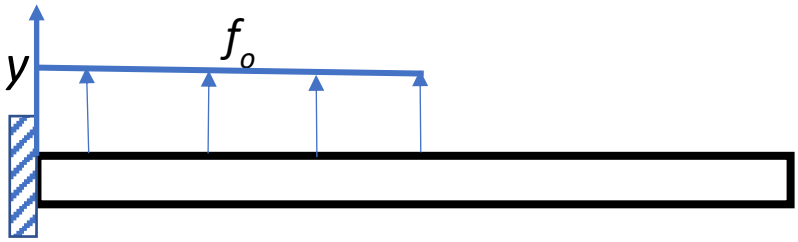
Problem 1. (Note: *P* is in *N*, *w* is in *N/m*)



Problem 2.



Problem 3. (Taken from the Fall 2017 final exam): The cantilever beam of length *L* is subjected to a transverse load f_o (given in N/m) applied over the first half of the beam.



Problem 4. Assuming that the lift distribution over a wing of length L is quadratic, as in

$$l(x) = l_0 \left(1 - \left(\frac{x}{L}\right)^2\right),$$

with l_0 given in N/m, and assuming that the wing is cantilever to the fuselage,

a) Compute the reactions at the fuselage
b) Compute the distribution of the resultant shear force ($V_z(x)$) and resultant bending moment ($M_y(x)$). Put your solution in a non-dimensional form (i.e., as a function of (x/L)), and plot the two non-dimensional solutions for $0 \leq x/L \leq 1$.
c) Check that your solution found in b) matches the reactions found in a)
d) Check also that your solution found in b) corresponds to your expectation at the end of the wing (i.e., at $x = L$)