Department of Civil and Environmental Engineering,

Fall 2016
Due: 10/17/2016

ENCE 353 Homework 3

Question 1: The three-pinned arch structure shown in Figure 2 carries a uniformly distributed load W (N/m) across its entire 6m span.

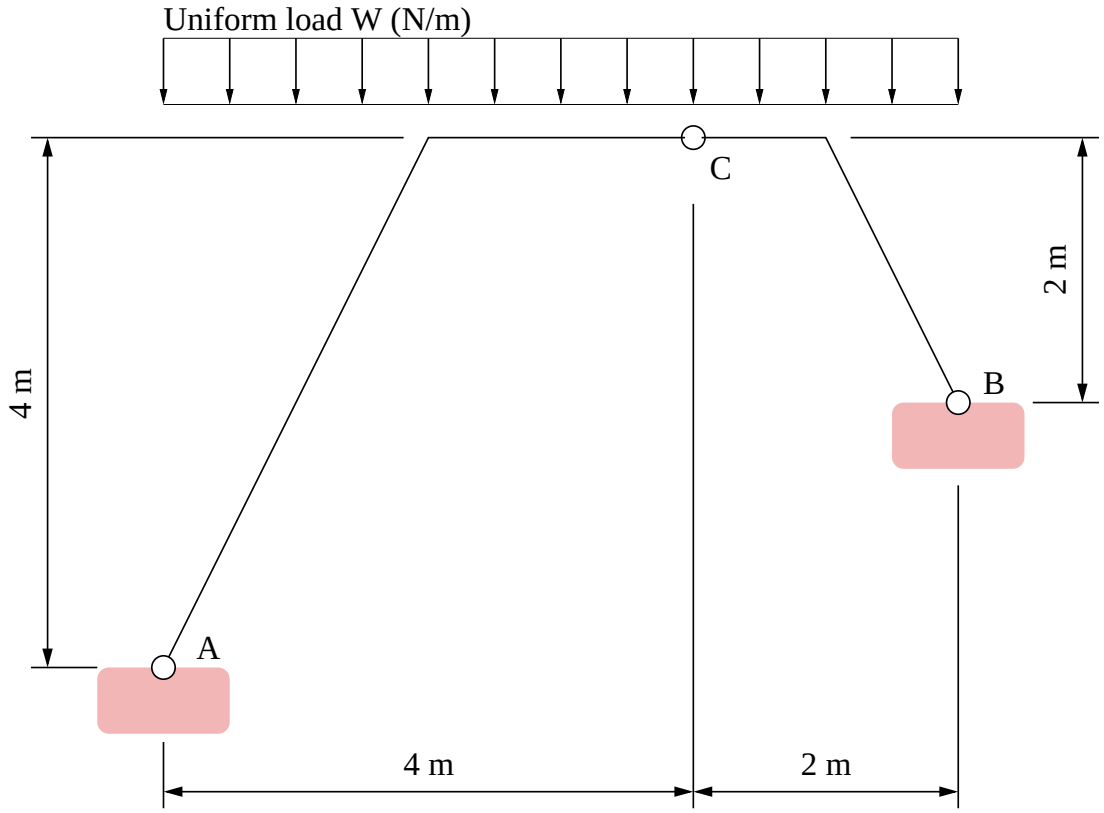

Figure 1: Elevation view of a three-pinned arch structure carrying a uniformly distributed load.

[1a] Compute the vertical and horizontal components of reaction force at supports A and B.

Question 2: The cable structure shown in Figure 2 carries a triangular load that is zero at the left-hand support and increases to w_o N/m at the right-hand support.

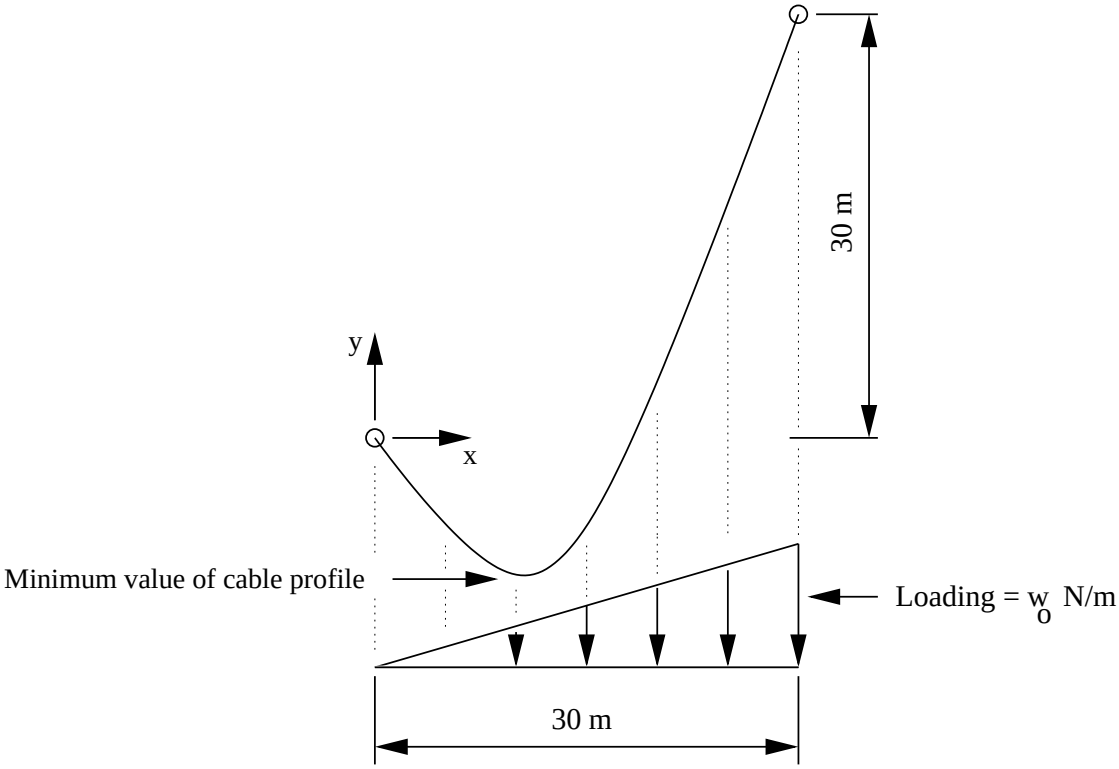

Figure 2: Elevation view of a swing bridge carrying a triangular loading.

[2a] Starting from first principles (i.e., the differential equation), show that cable profile is given by the equation

$$y(x) = \frac{w_o x^3}{180H} + \left(1 - \frac{5w_o}{H}\right) x. \tag{1}$$

Now let us assume that the minumum value of the cable profile occurs at x = 10.

[2b] Show that the horizontal cable force is:

$$H = \frac{20w_o}{6}. \tag{2}$$

[2c] Draw and label a diagram showing the horizontal and vertical components of reaction force at the left- and right-hand cable supports.