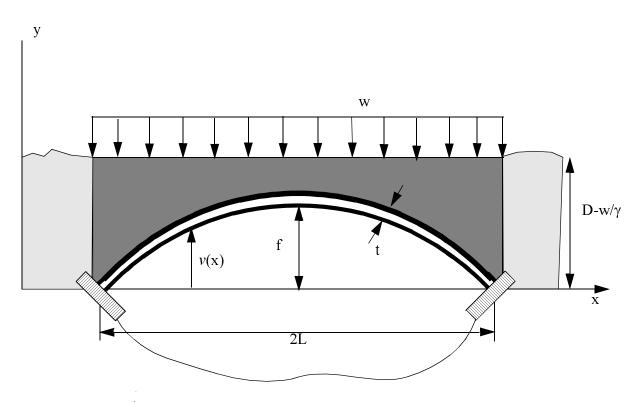# Problem Set 3

Problem 3.1

Consider the following ideal arch (only compression forces act on the structure) with fixed supports at both ends.

You have to build a solid masonry bridge to support not only the self-weight of the structure (γ, weight per unit volume for both the fill and the vault) but also a uniform load (w, weight per unit area).

1) Neglect the self-weight (i.e. assume the loading is uniform) and find the corresponding shape v(x).

2) Using the shape determined in (1), discuss how you would include, in an approximate way, the self-weight.

3) Given σ_{max} and f (the maximum height), determine the thickness t as a function of f, σ_{max} and D.