

Problem:

$$\frac{d^2u}{dx^2} - u = -1 \quad 0 < x < 1$$

$$u = u(x)$$

$$B.C.: u(0) = 0, u(1) = 0$$

Exact Solution

$$u(x) = x - \frac{\sinh(x)}{\sinh(1)}$$

Galerkin Method of weighted residual

$$u = ax(1 - x)$$

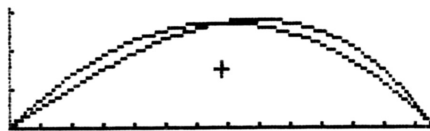
$$w = \frac{\partial u}{\partial a} = x(1 - x)$$

$$I = \int_0^1 [x(1 - x)][2a - ax(1 - x) + x]dx = 0$$

$$a = .22727$$

$$u = .22727x(1 - x)$$

Runtime: 1 min 48 sec



$$.14588x(1 - x) + .16279x^2(1 - x)$$

Runtime: 31 min 16 sec

