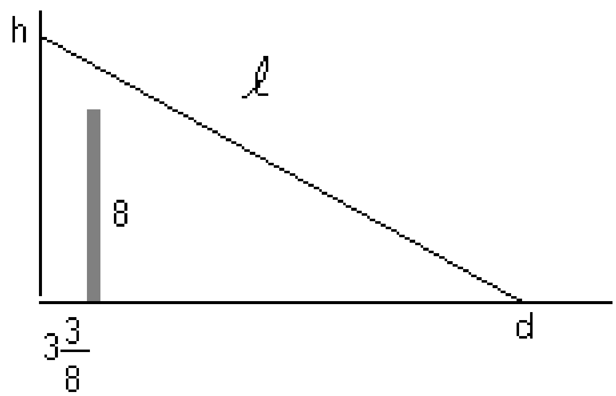
#30, General Method

1 p127, #30[alt], §1 Definition

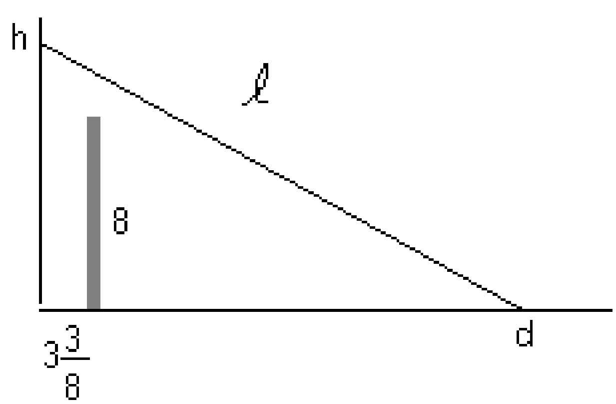


Two degrees of freedom: h and d

One *inequality* constraint (from similar triangles):

$$h\frac{d - 3\frac{3}{8}}{d} > 8 \qquad \Longrightarrow \qquad h[d - 3\frac{3}{8}] - 8d > 0 \tag{1}$$

2 p127, #30[alt], §2 Formulation



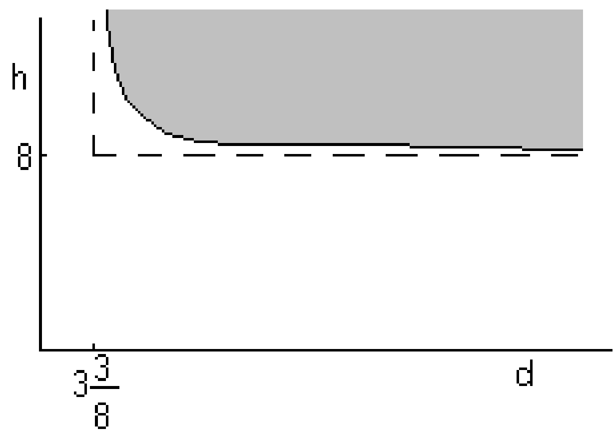
Minimize

$$\ell(h, d) = \sqrt{h^2 + d^2} \tag{2}$$

(from Pythagoras), subject to

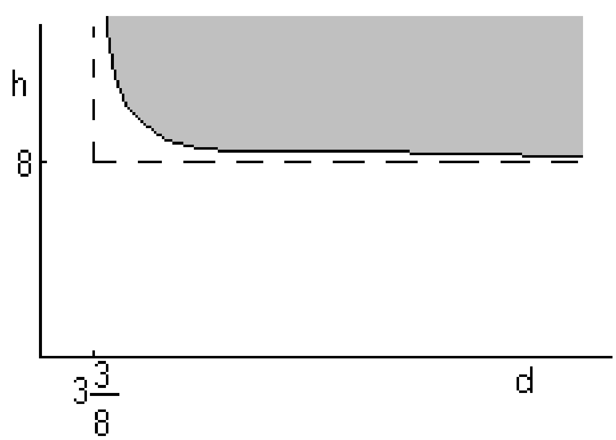
$$h[d - 3\tfrac{3}{8}] - 8d > 0 \tag{3}$$

3 p127, #30[alt], §3 Interior Minima



$$\frac{\partial \ell}{\partial d} = 0 \qquad \frac{\partial \ell}{\partial h} = 0 \qquad \Longrightarrow \qquad d = h = \ell = 0 \tag{4}$$

4 p127, #30[alt], §4 Boundary Minima



Use a Lagrangian multiplier for the constraint

$$f = \sqrt{h^2 + d^2} + \lambda(h[d - 3\tfrac{3}{8}] - 8d). \tag{5}$$

Search for an unconstrained stationary point:

$$\frac{\partial f}{\partial d} = 0 \qquad \frac{\partial f}{\partial h} = 0 \qquad \frac{\partial f}{\partial \lambda} = 0 \tag{6}$$