$$TC = NS + \frac{Q}{2} \times H$$

$$TC = \left(\frac{D}{Q}\right) S + \frac{Q}{2} \times H$$

To find the optimal order quantity (EOQ), we minimize the total annual cost by taking the de

TC with respect to Q and setting it equal to zero:

$$\frac{d(TC)}{dQ} = -\frac{DS}{Q^2} + \frac{H}{2} = 0$$

$$\frac{DS}{Q^2} = \frac{H}{2}$$

$$DS = \frac{HQ^2}{2}$$

$$Q^2 = \frac{2DS}{H}$$

$$Q = \sqrt{\frac{2DS}{H}}$$

This gives us the Economic Order Quantity (EOQ) formula for deterministic inventory proble

shortages:

$$EOQ = \sqrt{\frac{2DS}{H}}$$