Call option $C(S,t) = SN(d_1) - Ee^{-r(T-t)}N(d_2)$

$$d_{1,2} = \frac{\log\left(\frac{S}{E}\right) + \left(r \pm \frac{1}{2}\sigma^2\right)(T-t)}{\sigma\sqrt{T-t}}$$

Assume everything above is known except $\sigma$

$$\underbrace{SN(d_1) - Ee^{-r(T-t)}N(d_2)}_{C(\sigma)} = C_M \leftarrow \text{market price}$$

$$C(\sigma) - C_m = 0$$

root finding problem to calculate $\sigma_i$

$dS = rSdt + \sigma_i S dX$