12-6 potential

$U(x)$=potential energy

$$U(x) = \frac{A}{x^{12}} - \frac{B}{x^6}$$

Find X_{min}

$$\frac{d}{dx}U(x) = \frac{-A12}{x^{13}} - \frac{(-6B)}{x^7} = -F$$

$F = 0$ at minimum of potential energy graph

$$F = 0 = \frac{-12A}{x_{min}^{13}} + \frac{6B}{x^7}_{min}$$

$$x_{min} = \left(\frac{2A}{B}\right)^{\frac{1}{6}}$$

Taylor Series Expansion

$$U(x_{min} + \Delta x) \approx \frac{U(x_{min})}{0!} + \frac{U'(x_{min})\Delta x}{1!} + \frac{U''(x_{min})\Delta x^2}{2!} + ... + 0$$

Δx needs to be "small"

$$U(x_{min} + \Delta x) - U(x_{min}) = \Delta U = 0 + \frac{1}{2}U''(x_{min})\Delta x^2$$

Also where force = 0

$$\Delta U = \frac{1}{2}k\Delta x^2$$

k = potential energy for a spring