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| Name: | Signature: |
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Q3. (25 pts)

A hooke's law force $-kx$ and a constant conservative force F in the $+x$ -direction act on an atomic ion.

a) Show that a possible potential-energy function for this combination of forces is

$$U(x) = kx^2/2 - Fx - F^2/2k . \text{ Is this the only possible function?}$$

b) Find the stable equilibrium position.

c) Graph $U(x)$ (in units of F^2/k) versus x (in units of F/k) for values of x between $-5F/k$ to $5F/k$.

d) If the total energy is $E = F^2/k$, what are the maximum and minimum values of x that the ion reaches in its motion?