13a)

$$L = \frac{m_1}{2}(\dot{x_1})^2 + \frac{m_2}{2}(\dot{x_2})^2 - k(x_1 - x_2)^2 \tag{5}$$

$$\begin{aligned}
\delta_x L &= \frac{\partial L}{\partial x_1}\delta x_1 + \frac{\partial L}{\partial x_2}\delta x_2 \\
&= -2k(x_1 - x_2)\delta x_1 + 2k(x_1 - x_2)\delta x_2 \\
&= -2k(x_1 - x_2)\delta x + 2k(x_1 - x_2)\delta x \\
&= 0
\end{aligned} \tag{6}$$

where $\delta x_1 = \delta x_2 = \delta x$ because both particles are being translated by the same amount.

This shows that the sum of the forces in a closed system is 0. The force particle 1 exerts on particle 2 is equal and opposite to the force particle 2 exerts on particle 1.

13b)

$$L = \frac{m_1}{2}\dot{x}^2 - kx^2 \tag{7}$$

$$\begin{aligned}
\delta_x L &= \frac{\partial L}{\partial x}\delta x \\
&= -2kx\delta x
\end{aligned} \tag{8}$$

This is not a closed system so the sum of the forces is not 0.