

2-5. Classically, the energy is defined as

$$E = \dot{x}p - L \quad (2.12)$$

Show that the energy at a final point is

$$\dot{x}_b \left( \frac{\partial L}{\partial \dot{x}} \right)_{x=x_b} - L(x_b) = - \frac{\partial S_{cl}}{\partial t_b} \quad (2.13)$$

while the energy at an initial point is

$$+ \frac{\partial S_{cl}}{\partial t_a}$$

*Hint:* A change in the time of an end point requires a change in path, since all paths must be classical paths.

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We have

$$\dot{x}_b = \left( \frac{dx}{dt} \right)_{t=t_b}$$