and therefore

$$\frac{\sin\theta_i}{v_1} = \frac{\sin\theta_r}{v_2} \tag{B.3}$$

2. **Mirror equation**: Derive the mirror equation

$$\frac{1}{i} + \frac{1}{p} = \frac{1}{f}$$

where i is the image distance, p is the object distance, and f is the focal length of the mirror.

Answer: See Section 3.4. Please note that all the steps must be completed explicitly, including the notes say "after some algebraic manipulation...".

3. **Young's experiment**: Light of wavelength λ illuminates two thin slits, separated by a distance d. On a distant screen an interference pattern is produced. Define an axis from the slits to the central maximum. Show that every other maximum lies in a direction at an angle θ_m with respect to this axis, given by

$$d\sin\theta_m = m\lambda$$

where $m = 0, \pm 1, \pm 2, \ldots$.

Answer: See section 6.1.2.