Problem 9.2

a)

$$d_{i_0} = \left(\frac{1}{5} - \frac{1}{6}\right)^{-1} = 30\text{cm}$$

$$M_0 = -\frac{d_i}{d_o} = -\frac{30}{6} = -5$$

b)

$$\begin{aligned} 10 &= \left(\frac{1}{d_i} + \frac{1}{d_o}\right)^{-1} \\ &= \frac{d_i d_o}{d_o + d_i} \\ 10(d_o + d_i) &= d_i d_o \\ 10d_o &= d_i d_o - 10d_i \\ d_i &= \frac{10d_o}{d_o - 10} \end{aligned}$$

$$M = -\frac{\frac{10d_o}{d_o-10}}{d_o} M_0 = -\frac{10}{d_o - 10} M_0 = \frac{50}{d_o - 10}$$

Using $d_o = -30$,

$$d_i = \frac{10 \times -30}{-30 - 10} = 7.5$$

$$M = \frac{50}{-30 - 10} = -1.25$$