Problem 8.3

a)

Since $I_f = I_0 \sin^2\theta$, increasing θ by eating more doughnuts will increase the amount of light I_f detected.

b)

Assuming the incident beam is randomly polarized,

$$2 \times 10^{-4} I_0 = 0.1\% \frac{I_0}{2} \sin^2\theta$$

$$\sin\theta = \sqrt{\frac{2 \times 10^{-4} I_0}{0.05\% I_0}}$$

$$\theta = \arcsin\sqrt{\frac{2 \times 10^{-4}}{0.5 \times 10^{-3}}} = 39.2315^\circ$$

$$\text{Number of doughnuts} = \frac{39.2315}{0.15} \approx 261.543 \approx 262$$