For Cohn's section

Things you will be given on midterm I: (ie don't memorize these if you don't want to!)

- Waves

$$\vec{\nabla} = \hat{x}\frac{\partial}{\partial x} + \hat{y}\frac{\partial}{\partial y} + \hat{z}\frac{\partial}{\partial z} \tag{1}$$

and

$$\begin{aligned} &\vec{\nabla}\cdot\vec{E} = 0 \\ &\vec{\nabla}\cdot\vec{B} = 0 \\ &\vec{\nabla}\times\vec{E} = -\frac{\partial\vec{B}}{\partial t} \\ &\vec{\nabla}\times\vec{B} = \mu_0\epsilon_0\frac{\partial\vec{E}}{\partial t} = \frac{1}{c^2}\frac{\partial\vec{E}}{\partial t} \end{aligned} \tag{2}$$

Radiation pressure if radiation is all absorbed:

$$P = \frac{\bar{S}}{c} = \frac{E_0 B_0}{2\mu c} \tag{3}$$

where $\bar{S}$ is the time averaged Poynting vector. (Note correction!)

- Geometric Optics

Lensmaker's equation:

$$\frac{1}{f} = (n-1)\left(\frac{1}{R_1} + \frac{1}{R_2}\right) \tag{4}$$

Magnifying power:

  - eye focused at infinity: $M = N/f$ where N is the near point (25 cm).
  - Eye focussed at near point: $M = N/f + 1$.

Trig identities:

$$\begin{aligned} &\cos(a+b) = \cos(a)\cos(b) - \sin(a)\sin(b) \\ &\sin(a+b) = \sin(a)\cos(b) + \cos(a)\sin(b) \\ &\cos(a)\cos(b) = \tfrac{1}{2}(\cos(a+b) + \cos(a-b)) \\ &\sin(a) \sim a \;\; a \ll 1 \\ &\cos(a) \sim 1 - \tfrac{1}{2}a^2\,,\; a \ll 1 \end{aligned} \tag{5}$$