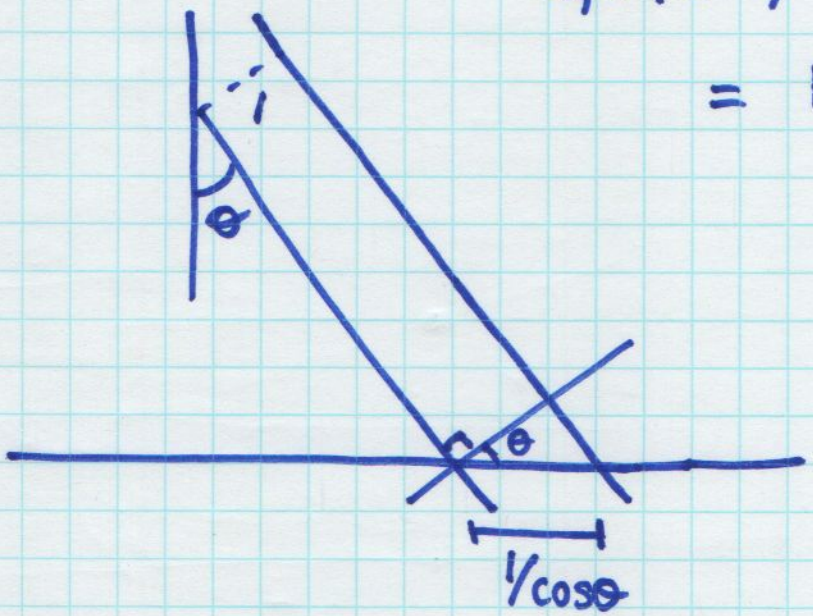
CSE P576

1.1



light power / area

$= P / 1/\cos\theta = P\cos\theta$

$I_d = k_d i_d \cos\theta$

1.2

$I_s = k_s i_s \cos^{\alpha}\phi$

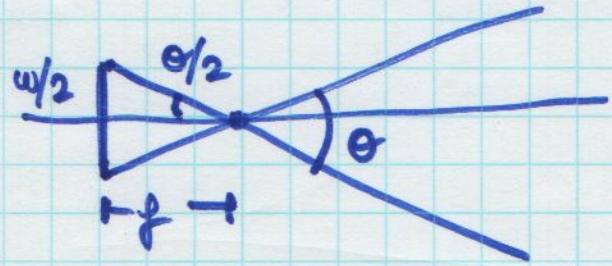
1.3

$\frac{u}{f} = \frac{x}{z}$ $\quad u = f\frac{x}{z}$

$v = f\frac{y}{z}$

$$s\begin{pmatrix} u \\ v \\ 1 \end{pmatrix} = \begin{pmatrix} f & 0 & 0 \\ 0 & f & 0 \\ 0 & 0 & 1 \end{pmatrix}\begin{pmatrix} x \\ y \\ z \end{pmatrix}$$

1.4.

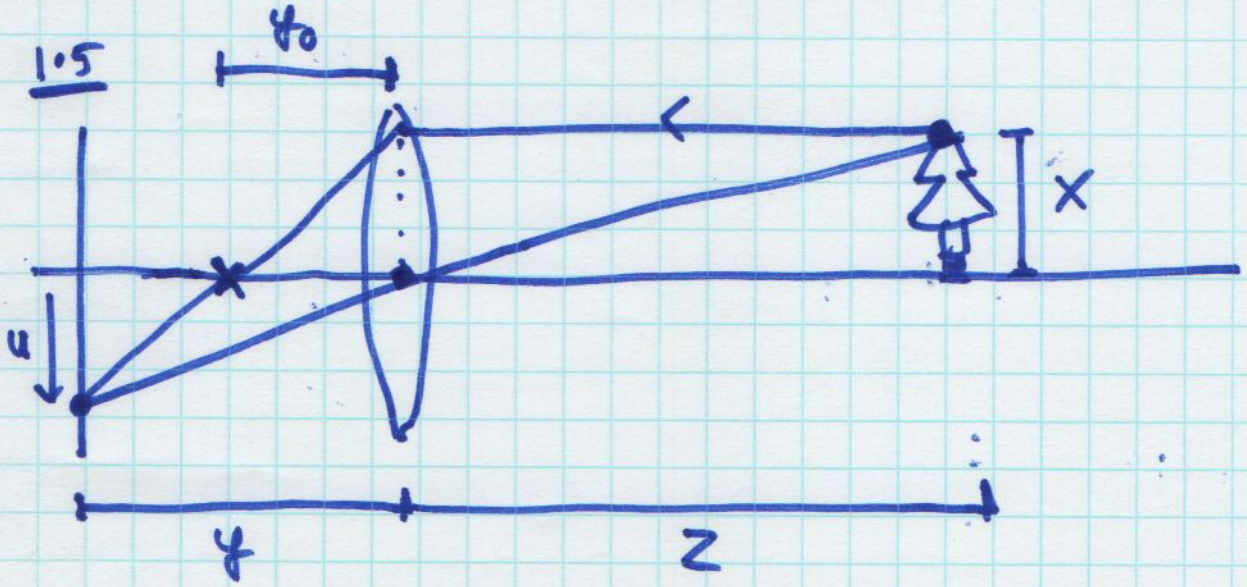


$\tan\theta/2 = \frac{w/2}{f}$ $\quad \theta = 2\,\mathrm{atan}\frac{w}{2f}$

$w = 35,\ f = 50$ $\quad \theta = 38.6°$

100 $\quad = 19.9°$

1.5



$$\frac{u}{v} = \frac{X}{Z} \qquad \frac{u}{X} = \frac{v}{Z} = \frac{v - y_0}{y_0}$$

$$\frac{u}{v - y_0} = \frac{X}{y_0} \qquad \frac{1}{y_0} = \frac{1}{v} + \frac{1}{Z}$$

1.6

$$\begin{bmatrix} p_r \\ p_g \\ p_b \end{bmatrix}' = \begin{bmatrix} \lambda_1 & 0 & 0 \\ 0 & \lambda_2 & 0 \\ 0 & 0 & \lambda_3 \end{bmatrix} \begin{bmatrix} p_r \\ p_g \\ p_b \end{bmatrix}$$