Hw #5 Solutions

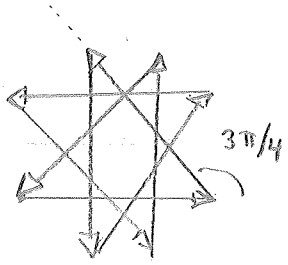
36.76 a) $d\sin\theta = m\lambda \Rightarrow \sin\theta \approx \theta \sim \frac{y}{R}$

& $d = \frac{\lambda R}{y} = \frac{632.8\text{ nm} \cdot 2500\text{ mm}}{1.53\text{ mm}} = 1.034\text{ mm}$

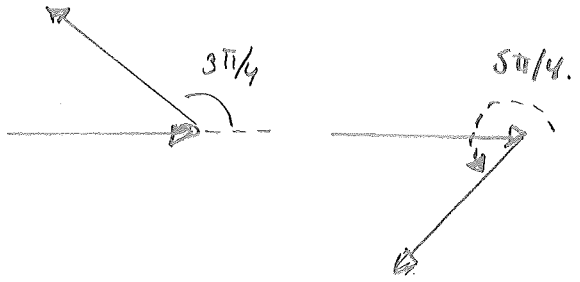
b) Slit width $a\sin\theta = \lambda$ at min.
7th order int. max is missing so $\frac{d}{a} = 7$

$a = 0.1477\text{ mm}$.

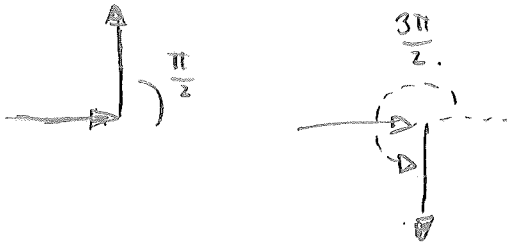
36.61. (a)



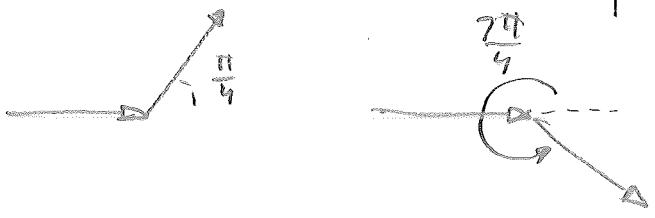
If $\varphi = \frac{5\pi}{4}$, this reflects across x-axis:



If $\varphi = \frac{3\pi}{2}$, you get $\varphi = \frac{\pi}{2}$ reflected across x-axis:



If $\varphi = \frac{7\pi}{4}$, you get $\varphi = \frac{\pi}{4}$ reflected across x-axis.



(b) For $\varphi = \frac{3\pi}{4}$, 1 cancels 5
2 " 6
3 " 7
4 " 8

For $\varphi = \frac{5\pi}{4}$, same.

For $\varphi = \frac{3\pi}{2}$, 1 cancels 3
2 " 4
5 " 7
6 " 8

See Fig 36.14 c

For $\varphi = \frac{7\pi}{4}$, 1 cancels 5 etc