P #3

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$d = .250\ mm = 2.5 \times 10^{-4}\ m$

$\lambda = 546.1\ nm = 546.1 \times 10^{-9}\ m$

$L = 1.20\ m$

a) $x_m \approx \frac{m \cdot \lambda \cdot L}{d}$ for $m = 1$

$$x_1 = \frac{(1)(546.1 \times 10^{-9} m)(1.20 m)}{(2.5 \times 10^{-4} m)}$$

$x_1 = .00262\ m \Rightarrow \boxed{x_1 = 2.62\ mm}$

b) For destructive interference, use $m = \frac{1}{2}, 1\frac{1}{2}$...so waves are $\frac{1}{2}\lambda$ difference

$x \approx \frac{m \cdot \lambda \cdot L}{d}$ for $m = \frac{1}{2}$ and $1\frac{1}{2}$

$$x \approx \frac{(\frac{1}{2}) \cdot (546.1 \times 10^{-9} m)(1.20 m)}{(2.5 \times 10^{-4} m)} = .00131\ m$$

$$x \approx \frac{(1\frac{1}{2}) \cdot (546.1 \times 10^{-9} m)(1.20 m)}{(2.5 \times 10^{-4} m)} = .00393\ m$$

$\Delta x = .00393\ m - .00131\ m$

$\Delta x = .00262\ m \Rightarrow \boxed{\Delta x = 2.62\ mm}$