THIRD MIDTERM

Name (print) MOLINA Name (sign)____________________

Discussion Instructor (circle one): DeTienne Hamed Molina Paul Smith Zhang

Discussion Section #________

SHOW ALL WORK!!!!!!
REPORT ALL NUMBERS TO THREE SIGNIFICANT FIGURES!
Use the conversion constants and data given on the front page.

A two slit interference experiment is performed with two colors of light. The seventh order (m = 7, where the center is m = 0) fringe for light of $\lambda = 535$ nm is at 9.50 cm from the center on a screen 5.00 m from the two slits.

(a) Calculate the wavelength of light that will have the fifth order fringe at 9.50 cm from the center.

(b) Calculate the slit separation.

\[
\frac{d \sin \theta}{L} = m \lambda \\
\frac{dy}{L} = m \lambda \\
\frac{dy^2}{L^2} = 7 \lambda_1 \Rightarrow d = \frac{7 \lambda_1}{y_7} = 2.04 \times 10^{-4} \text{ m}
\]

\[
\text{change } \lambda_1 \rightarrow \lambda_2 \\
\frac{dy_5}{L} = 5 \lambda_2 \Rightarrow \lambda_2 = \frac{7}{5} \lambda_1 \left( \frac{y_5}{y_7} \right) = \frac{7}{5} \lambda_1 = 777 \text{ nm}
\]