

## Quiz #3 (Plane Waves, Interference, Diffraction)

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Quantum Mechanics

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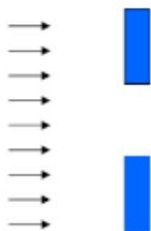
### Prob. 1

A plane electro-magnetic wave is given as  $\vec{E}(z, t) = \bar{x}E_0 \exp\left[i\left(\frac{z}{\sqrt{3}} - 10^8 t\right)\right]$ .

- (a) In which direction does this wave propagate?
- (b) What is the angular frequency of this wave?
- (c) What is the wavelength of this wave?
- (d) What is the governing wave equation for this wave?

### Prob. 2

Light passes through an opening as shown below and experiences diffraction. How does the diffraction angle change if the width of the opening doubles?



### Prob. 3

Light passes through a diffraction grating (or periodic scatters). Determine the angles at which the diffracted light propagates. Assume the light wavelength is  $1\mu\text{m}$  and the grating period is  $2.5\mu\text{m}$ .