YOU WILL NEED YOUR LAB MANUAL TO COMPLETE THIS HOMEWORK

1. The figure shows the electric field part of an electromagnetic wave.

   ![Electric Field Diagram]

   a) In the figure, draw the polarization direction of the EM wave, a magnetic field wave and a direction of propagation of the EM wave that agrees with the direction of the fields drawn in the figure. [2 pts]

2. According to your lab manual:

   a) What is the frequency of the EM waves you will be using? Calculate the wavelength of these waves. (Include units). [2 pts]
b) What is a polarizer? What can be used to polarize microwaves? [1 pt]

3. A polarizer is placed between a transmitter and a receiver as shown in the figure. The transmitter is positioned vertically meaning the EM waves emitted by it will be polarized vertically. The polarizer is placed at the center, oriented at an angle $\theta$ from the vertical. The receiver is oriented horizontally and will only receive waves parallel to it. The transmitter is made to emit EM waves with electric field of amplitude $E_o$.

a) What is the amplitude of the electric field of the EM wave after the polarizer? (Write your answer in terms of $E_o$ and $\theta$. Show all work.) [1 pt]
b) What is the amplitude of the electric field as measured by the receiver ($E_{\text{measured}}$)? (Write your answer in terms of $E_0$ and $\theta$. Show all work.) [2 pts]

c) For what angle(s) $\theta$ (between 0 and 360 degrees) will the amplitude of the electric field measured by the receiver be a minimum? Maximum? (Note: You will have more than one for each.) [2 pts]