Physics II

EM Spectrum

$c=3.00 \times10^8$ m/s   Speed of light in vacuum
$c = \lambda f$ Fundamental equation of electromagnetic waves
$B=E/c$ Relation between electric and magnetic field in an E.M.W.

Problem 1.- Visible light has a narrow range of wavelengths (400nm for violet to 700nm for red). Would you be able to see an electromagnetic wave of frequency $f=1.5\times10^{15}$ Hz? How would you call such a wave?

Problem 2.- Non-invasive measurement of the oxygen content in hemoglobin is sometimes done with "near infrared spectroscopy". What wavelengths are we referring to with "near infrared"?

Problem 3.-
a) Would you be able to see an electromagnetic wave of frequency $f=3.75\times10^{14}$ Hz? How would you call such a wave?

b) If the amplitude of the electric field of an EM wave is 5.5 V/m, calculate the amplitude of the magnetic field.

Problem 4.- Are the wavelengths of TV transmissions shorter or longer than those of visible light?