Part 1

Pre-lab

1.

2.

```
function E2lam(en,unit,ew,n)
%Ezra Alcon-Kirshman
%optics 211
%energy to wavelength converter
%to use run function with "en" as energy in meV and n as index of refraction

c=3e8; %speed of light in a vacuum in m/s
h=4.136e-15; %planck's constant
E= en/1000; %converts the Energy from meV to eV

lambda1 = h*c/E; %calculates the wavelength corresponding to E in meters
lambda = lambda1/n; %takes refractive index into account
lambda_um = lambda/10^-6; %computes the wavelength in microns
lambda_nm = lambda/10^-9; %computes the wavelength in nanometers

head=['the wavelength corresponding to an energy of',num2str(ew),unit, ' and
an index of refraction of ',num2str(n), ' is:']; %converts the energy value
to a string and surrounds it with text
ans1=[num2str(lambda), 'm']; %converts the wavelength value to a string and
provides units
ans2=[num2str(lambda_um), 'um'];
ans3=[num2str(lambda_nm), 'nm'];

disp(head) %Displays an answer heading in the command window
disp(ans1) %Displays the wavelength in microns
disp(ans2) %Displays the wavelength in microns
disp(ans3) %Displays the wavelength in nanometers


function Wave2Energy(wv,unit,ew,n)
%Ezra Alcon-Kirshman
%optics 211
%wavelength to energy converter
% to use run function with "wv" as wavelength in nm and n as index of
refaction


c=3e8; %speed of light in a vacuum in m/s
h=4.136e-15; %planck's constant
w = wv*10e-10;


EeV = (h*c)/(w*n); % converts wavelength to energy in eV
EmeV = EeV.*1000; %converts eV to meV
jo = EeV*(1.6022e-19); %converts eV to J
head=['the energy corresponding to a wavelength of ',num2str(ew),unit, 'and
an index of refration of ', num2str(n), ' is:']; %converts the wavelength to
a string and surrounds it with text
ans1 = [num2str(EeV), ' eV'];
```

```
ans2 = [num2str(EmeV), ' meV'];
ans3 = [num2str(jo),'J'];

disp(head) %Displays an answer heading in the command window
disp(ans1) %Displays an answer in eV in the command window
disp(ans2) %Displays an answer in meV in the command window
disp(ans3) %Displays an answer in J in the command window
```

3. I think my comments on my code explain clearly what is happening and how everything is calculated

```
OPT211_lab4_test('meV',295,1)
the wavelength corresponding to an energy of295meV and an index of refraction
of 1 is:
4.2061e-06m
4.2061um
4206.1017nm
>> OPT211_lab4_test('um',4.2,1)
the energy corresponding to a wavelength of 4.2um and an index of refraction
of 1 is:
0.29543 eV
295.4286 meV
4.7334e-20J
>> OPT211_lab4_test('Dm',4.2,1)
Warning: please imput valid unit, for more help review
help file.
> In OPT211_lab4_test (line 59)
>> OPT211_lab4_test('Dm',4.2,1)
Warning: please input valid unit, for more help review
help file.
> In OPT211_lab4_test (line 59)
>>
```

(the "warning" shows up as an actual warning using the warning command)

Mid-lab

a.

the wavelength corresponding to an energy of3.97e-20J and an index of refraction of 1 is:
5.0075e-06m
5.0075um
5007.5155nm

b.

the energy corresponding to a wavelength of 5umand an index of refration of 1 is:
0.24816 eV
248.16 meV
3.976e-20J

c.

the wavelength corresponding to an energy of248meV and an index of refraction of 1 is:
5.0032e-06m
5.0032um
5003.2258nm

d.

the energy corresponding to a wavelength of 1.5635e-06m and an index of refraction of 3.2 is:
0.248 eV
248.0013 meV
3.9735e-20J

e.
the wavelength corresponding to an energy of0.248eV and an index of refraction of 3.2 is:
1.5635e-06m
1.5635um
1563.5081nm
f.
Warning: please imput valid unit, for more help review
help file.
> In OPT211_lab4_test (line 59)
g.
the energy corresponding to a wavelength of 550nm and an index of refraction of 1 is:
2.256 eV
2256 meV
3.6146e-19J
h.
the energy corresponding to a wavelength of 352.6nm and an index of refraction of 1.56 is:
2.2558 eV
2255.7703 meV
3.6142e-19J
i.
the wavelength corresponding to an energy of1.9e-13J and an index of refraction of 1 is:
1.0463e-12m
1.0463e-06um
0.0010463nm
j.
the energy corresponding to a wavelength of 9999999988m and an index of refraction of 1 is:
1.2408e-16 eV
1.2408e-13 meV
1.988e-35J

2.

Part 2

2.1

2.2

2.3

Post-lab