Stellar Motion Project

Instructions are in the task pane to the left. Complete and submit each task one at a time.

Do not edit. This code loads the data and defines measurement parameters.

```
load starData
nObs = size(spectra,1)
nObs = 357
lambdaStart = 630.02
lambdaStart = 630.0200
lambdaDelta = 0.14
lambdaDelta = 0.1400
```

Task 1:

The `spectra` data was collected at evenly-spaced wavelengths, and you know the starting wavelength ($\lambda start$), the spacing ($\lambda delta$), and the number of observations.

```
lambdaEnd = lambdaStart + (nObs-1)*lambdaDelta
lambdaEnd = 679.8600
lambda = (lambdaStart:lambdaDelta:lambdaEnd)'
lambda = 357×1
   630.0200
   630.1600
   630.3000
   630.4400
   630.5800
   630.7200
   630.8600
   631.0000
   631.1400
   631.2800
```

Task 2-4 :

TASK2 Extract the sixth column of `spectra` to a vector named `s`.

TASK3 Plot the spectra (`s`) as a function of wavelength (`lambda`), using log scales on both axes. Use point markers (`.`) and a solid line (−) connecting the points. Add the x-label `"Wavelength"` and the y-label `"Intensity"` to the plot.

TASK4 Create two variables, `sHa` and `idx` that contain the minimum value of `s` and the index where the minimum value occurred. Use `idx` to index into `lambda` to find the wavelength of the Hydrogen-alpha line. Store the result as `lambdaHa` (λHa).

```
s=spectra(:,2)
s = 357×1
10⁻¹² ×
```

```
    0.1340
    0.1338
    0.1347
    0.1357
    0.1354
    0.1343
    0.1335
    0.1325
    0.1335
    0.1329
```

```
loglog(lambda,s,".-")
xlabel("Wavelength")
ylabel("Intensity")
[sHa,idx]=min(s)
sHa = 7.2400e-14
idx = 187
lambdaHa=lambda(idx)
lambdaHa = 656.0600
```
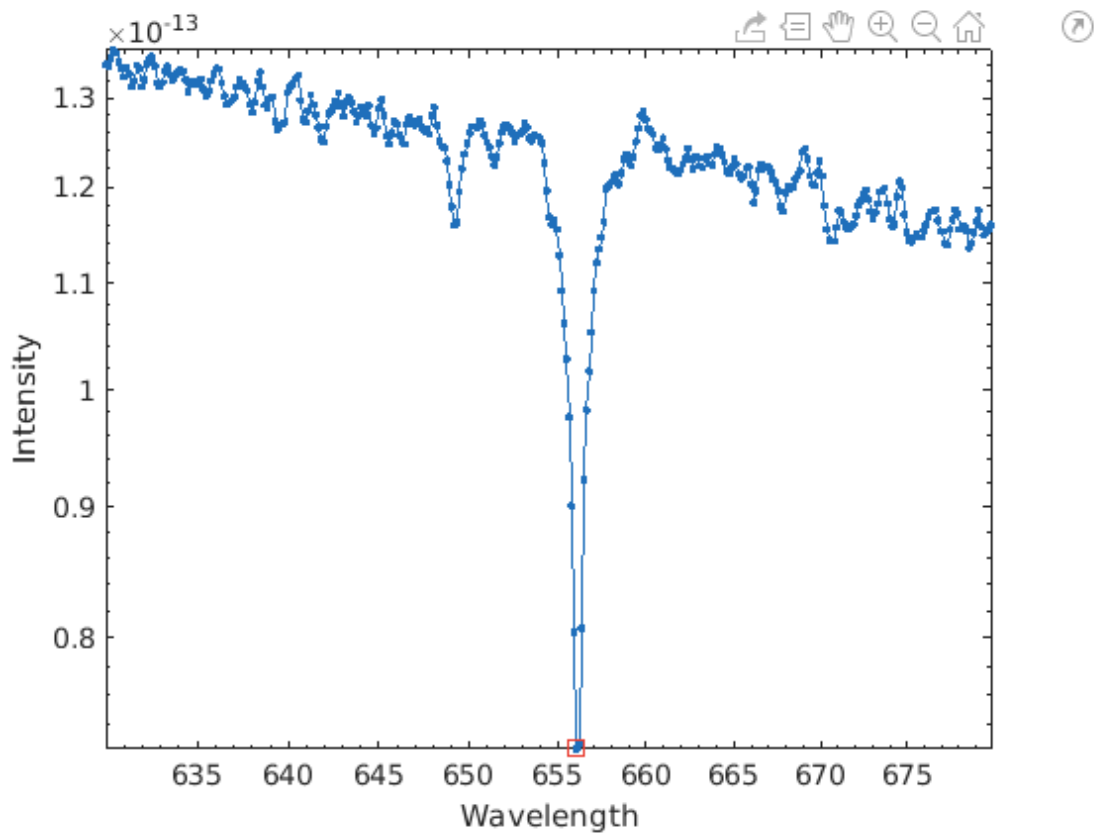
Task 5

Add a point to the existing graph by plotting x = lambdaHa, y = sHa as a red square ("rs") with a marker size ("MarkerSize") of 8.

```
hold on
loglog(lambdaHa,sHa,"rs","MarkerSize",8)
hold off
```

Task 6

Calculate the redshift factor and the speed (in km/s) at which the star is moving away from the earth.

Assign the redshift factor to a variable called z and the speed to a variable called $speed$.

```
z = lambdaHa/656.28 − 1
z = −3.3522e−04
speed = z*299792.458
speed = −100.4973
```

Task 7

Modify the **Task 2 & 7** section of the script so that it performs the red shift calculation on the second star in $spectra$, not the sixth.

Further Practice