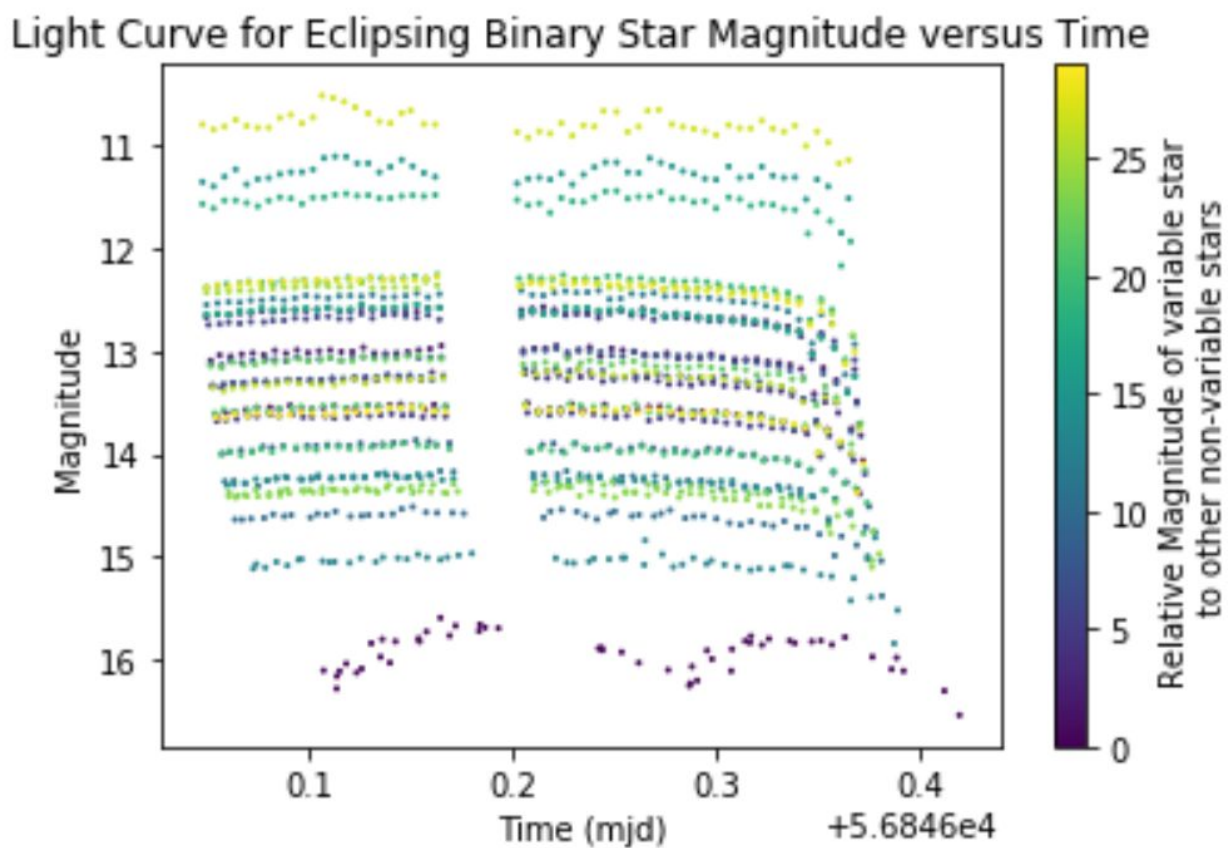


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Hw 2

*Data tables provided in google sheets attachment

Resulting output plot



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Iraf Commands:

```
u726005570@euporie.physics.tamu.edu: ~ — ecl.e — 80x24
Terminal types: xgterm,xterm,gterm,vt640,vt100,etc.
Enter terminal type [default xterm-256color]: xgterm
A new LOGIN.CL file has been created in the current directory.
You may wish to review and edit this file to change the defaults.
You may also add additional customizations to loginuser.cl
((iraf27) u726005570@euporie:~/iraf$ xgterm &
[1] 74882
((iraf27) u726005570@euporie:~/iraf$ pwd
/home/jupiter/users/u726005570/iraf
((iraf27) u726005570@euporie:~/iraf$ cd ~
((iraf27) u726005570@euporie:~$ ls
Desktop      Documents    Downloads    Library      I      iraf
((iraf27) u726005570@euporie:~$ cl
Warning: no login.cl found in login directory
adccdrom    deitab      kepler      noao        squiid      vo
apropos     esowfi      language    obsolete    stecf       xdimsum
cfh12k      finder      lists       optic       stsdas      xray
cirred      fitsutil    mem0        plot        system
ctio        gemini      mscdb       proto       tables
cutoutpkg   gmisc       mscrd       rvsao       ucsclris
dataio      guiapps     mtools      softools    upsquid
dbms        images      nfextern    song        utilities
ecl>
```

```
u726005570@euporie.physics.tamu.edu: ~ — ecl.e — 80x24
u726005570@euporie:~$ source .bashrc
-bash: .bashrc: line 72: unexpected EOF while looking for matching `"'
u726005570@euporie.physics.tamu.edu: ~/Downloads/student_copy — x_syste...
Last login: Mon Feb 24 09:10:10 on ttys000
u726005570@euporie:~$ cd iraf/
u726005570@euporie:~/iraf$ ls
login.cl      uparm
u726005570@euporie:~/iraf$ cp login.cl ~/login.cl
u726005570@euporie:~/iraf$ cd ..
u726005570@euporie:~$ ls
Desktop      Downloads    iraf
Documents    Library      login.cl
u726005570@euporie:~$ mv login.cl ~/Downloads/student_copy/
u726005570@euporie:~$ cd Downloads/student_copy/
u726005570@euporie:~/Downloads/student_copy$ cl
-bash: cl: command not found
u726005570@euporie:~/Downloads/student_copy$ source activate iraf27
((iraf27) u726005570@euporie:~/Downloads/student_copy$ cl
setting terminal type to xgterm...

NOAO/IRAF PC-IRAF Revision 2.16 EXPORT Thu May 24 15:41:17 MST 2012
This is the EXPORT version of IRAF V2.16 supporting PC systems.

Welcome to IRAF.  To list the available commands, type ? or ??.  To get
detailed information about a command, type `help <command>'.  To run a
command or load a package, type its name.  Type `bye' to exit a
```


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```

bias00000005.fit
bias00000006.fit
bias00000007.fit
bias00000008.fit
bias00000009.fit
bias00000010.fit
bias00000011.fit
bias00000012.fit
bias00000013.fit
bias00000014.fit
bias00000015.fit
bias00000016.fit
bias00000017.fit
bias00000018.fit
bias00000019.fit
bias00000020.fit

Output image = masterbias.fits, ncombine = 20
[ecl> imcopy masterbias.fits ../flat/masterbias.fits
ERROR: too many positional arguments for 'imcopy'
[ecl> imcopy masterbias.fits ../flat/masterbias.fits
masterbias.fits -> ../flat/masterbias.fits
[ecl> cd ../falt/
ERROR: Cannot change directory to '../falt/'
called as: 'cd ../falt/'
[ecl> cd ../flat/
[ecl> ls flat000000*.fit > flatlist
[ecl> imarith @flatlist - masterbias.fits sub//@flatlist
ls sub*.fit > subflats
im ecl> ls sub*.fit > subflats
[ecl> imcombine @subflats masterflat.fits combine=median scale=median

Feb 24 10:08: IMCOMBINE
combine = median, scale = median, zero = none, weight = none
blank = 0.

      Images      Median      Scale
subflat00000001.fit 23512.  1.000
subflat00000002.fit 22513.  1.044
subflat00000003.fit 21581.  1.089
subflat00000004.fit 20664.  1.138
subflat00000005.fit 19783.  1.189
subflat00000006.fit 18952.  1.241
subflat00000007.fit 18153.  1.295
subflat00000008.fit 17401.  1.351
subflat00000009.fit 16713.  1.407
subflat00000010.fit 15994.  1.470
subflat00000011.fit 15365.  1.530
subflat00000012.fit 14727.  1.597
subflat00000013.fit 14099.  1.668
subflat00000014.fit 13515.  1.740
subflat00000015.fit 12981.  1.811
subflat00000016.fit 12475.  1.885
subflat00000017.fit 11979.  1.963
subflat00000018.fit 11572.  2.032
subflat00000019.fit 11189.  2.101
subflat00000020.fit 10746.  2.188

Output image = masterflat.fits, ncombine = 20
[ecl> cp master* ../raw/
[ecl> cd ../raw/
[ecl> ls bfrmaster*.fits > imlist
ls: bfrmaster*.fits: No such file or directory
[ecl> ls
bias      flat      imlist      login.cl      raw
[ecl> ls bfrmaster*.fits > imlist
ls: bfrmaster*.fits: No such file or directory
[ecl> ls
bias      flat      imlist      login.cl      raw
[ecl> cd raw
[ecl> ls bfrmaster*.fits > imlist
[ecl> imarith @imlist - masterbias.fits sub//@imlist
ls sub*.fits > sublist
imarith @sublist / masterflat.fits f//@sublist
[ecl> ls sub*.fits > sublist
[ecl> imarith @sublist / masterflat.fits f//@sublist
[ecl>
```


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```
u726005570@euporie:~$ cd iraf/
u726005570@euporie:~/iraf$ ls
login.cl      uparm
u726005570@euporie:~/iraf$ cp login.cl ~/login.cl
u726005570@euporie:~/iraf$ cd ..
u726005570@euporie:~$ ls
Desktop      Downloads    iraf
Documents    Library     login.cl
u726005570@euporie:~$ mv login.cl ~/Downloads/student_copy/
u726005570@euporie:~$ cd Downloads/student_copy/
u726005570@euporie:~/Downloads/student_copy$ cl
-bash: cl: command not found
u726005570@euporie:~/Downloads/student_copy$ source activate iraf27
((iraf27) u726005570@euporie:~/Downloads/student_copy$ cl
setting terminal type to xgterm...
```

NOAO/IRAF PC-IRAF Revision 2.16 EXPORT Thu May 24 15:41:17 MST 2012
This is the EXPORT version of IRAF V2.16 supporting PC systems.

Welcome to IRAF. To list the available commands, type ? or ??. To get detailed information about a command, type 'help <command>'. To run a command or load a package, type its name. Type 'bye' to exit a package, or 'logout' to get out of the CL. Type 'news' to find out what is new in the version of the system you are using.

Visit <http://iraf.net> if you have questions or to report problems.

The following commands or packages are currently defined:

(Updated on 2013-12-13)

adccdrum.	deitab.	kepler.	noao.	squid.	vo.
apropos.	esowfi.	language.	obsolete.	stecf.	xdimsum.
cfh12k.	finder.	lists.	optic.	stdsas.	xray.
cirred.	fitsutil.	mem0.	plot.	system.	
ctio.	gemini.	mscdb.	proto.	tables.	
cutoutpkg.	gmisc.	mscred.	rvsao.	ucsclris.	
dataio.	guiapps.	mtools.	softools.	upsquid.	
dbms.	images.	nfxtern.	song.	utilities.	

```
[ecl> cd bias
[ecl> ls
bias00000001.fit      bias00000008.fit      bias00000015.fit
bias00000002.fit      bias00000009.fit      bias00000016.fit
bias00000003.fit      bias00000010.fit      bias00000017.fit
bias00000004.fit      bias00000011.fit      bias00000018.fit
bias00000005.fit      bias00000012.fit      bias00000019.fit
bias00000006.fit      bias00000013.fit      bias00000020.fit
bias00000007.fit      bias00000014.fit
[ecl> imcombine bias* masterbias.fits combine=median
imcopy masterbias fits ../flat/
Feb 24 10:06: IMCOMBINE
combine = median, scale = none, zero = none, weight = none
blank = 0.
Images
bias00000001.fit
bias00000002.fit
bias00000003.fit
bias00000004.fit
bias00000005.fit
bias00000006.fit
bias00000007.fit
bias00000008.fit
bias00000009.fit
bias00000010.fit
bias00000011.fit
bias00000012.fit
bias00000013.fit
bias00000014.fit
bias00000015.fit
bias00000016.fit
bias00000017.fit
bias00000018.fit
bias00000019.fit
bias00000020.fit
Output image = masterbias.fits, ncombine = 20
[ecl> imcopy masterbias.fits ../flat/masterbias.fits
ERROR: too many positional arguments for 'imcopy'
[ecl> imcopy masterbias.fits ../flat/masterbias.fits
masterbias.fits -> ../flat/masterbias.fits
[ecl> cd ../flat/
ERROR: Cannot change directory to '../flat/'
called as: 'cd ../flat/'
[ecl> cd ../flat/
[ecl> ls flat00000001.fits -la
-rw-r--r-- 1 u726005570 1048576 Feb 24 10:06 flat00000001.fits
```

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Extra Sources:

http://people.physics.tamu.edu/marshall/ASTR320_spring2020/iraf_commands.txt

```
### Reduction -- this removes instrument effects from the image so you can more accurately measure the signal of the star

cd bias
incombine bias* masterbias.fits combine=median
incopy masterbias.fits ../flat/masterbias.fits
cd ../flat/
ls flat000000*.fit > flatlist
ln -s $(cat flatlist | sed 's/masterbias.fits sub//')@flatlist
ls sub*.fit > subflat
incombine @subflat masterflat.fits combine=median scale=median
cp master* ../raw/
cd ../raw/
ls bfrmaster*.fits > bmlist
ln -s $(cat bmlist | sed 's/masterbias.fits sub//')@bmlist
ls sub*.fits > sublist
ln -s $(cat sublist | sed 's/masterflat.fits #//')@sublist

### Photometry-- this actually measures the incoming flux from the star

# Download the coordinates file on the website. (Copy the text into a text editor and save it into the folder with the science images (raw). Beware, the lab macs will save this as a .rtf file and iraf won't recognize it. You can change it back by right clicking the
coordinate file in the finder window, clicking on "name and extension" and deleting the ".rtf" at the end. At the end, it should be a file named "stars_v2.coo")

ls0 &
display fsubbfrmaster001.fits 1
tvmask 1 stars_v2.coo mark=circle radii=10 color=205
nqao
dglphot
daophot
plot fsubbfrmaster*.fits stars_v2.coo rmaster_v2.mag apertures=4
# choose centroid for centering algorithms, then press enter for everything else

txdump rmaster_v2.mag ID,MAG,ERR,IMAGE > rmaster_phot_v2.dat # type yes at the following prompt and press enter
hiselect fsub*.fits fields=DATE-OBS > dateobs.txt # type yes at the following prompt and press enter

### Making the Lightcurve

# Now it is time to plot your light curve. I would recommend using python for this. Here's a hint: to split the photometry measurements into a list for each particular star, take the modulo of the id number in the first column with the number of stars in your
coordinates list, so if you stored the first column of your rmaster_phot_v2.dat file in a list called "starid", the command would look like this:

starid = [a % 30 for a in starid]
```