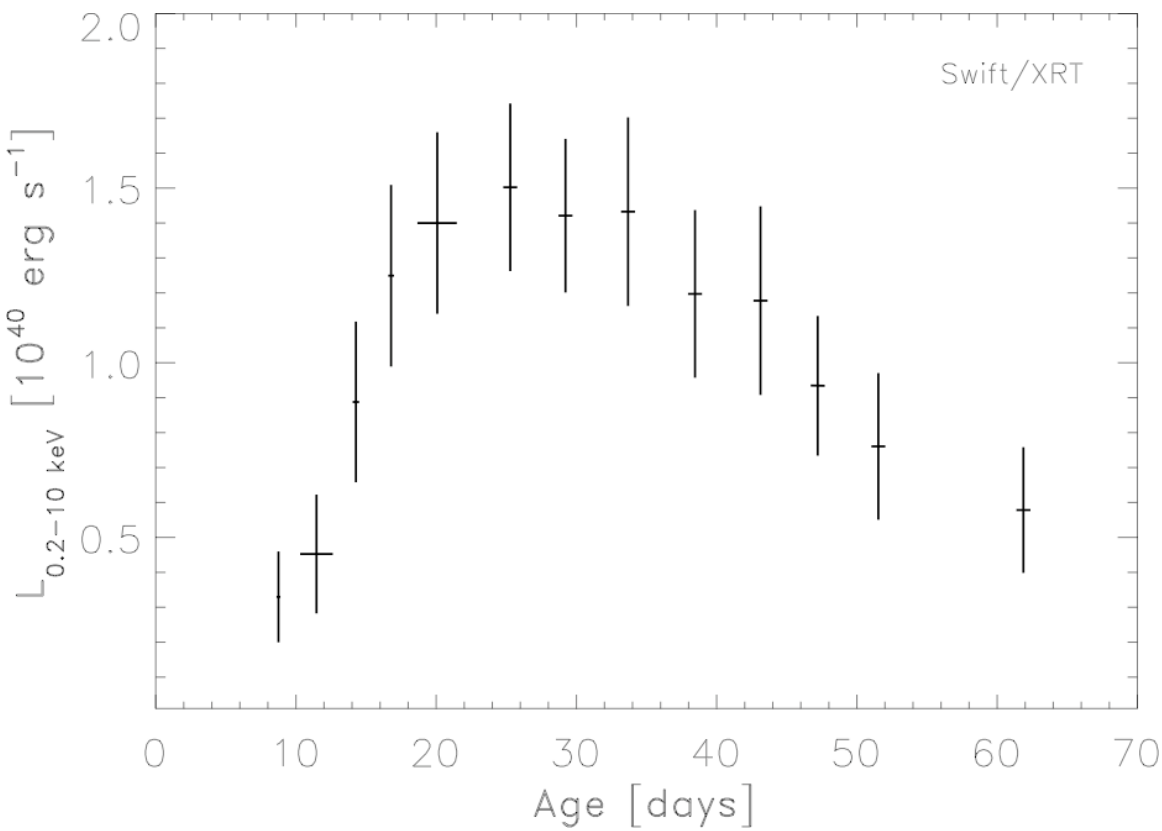
ASTR 288C

Homework 8

Due: 2 November 2009

1. Hand in the IDL plot that you created in the lab, or e-mail it to Stephen.T.Holland@nasa.gov.



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;##############################################
; ASTR288C -- Homework 8
;
; Due November 2 before the start of the lecture
; Send the plot that you produce per email to:
;
; Stephen.T.Holland@nasa.gov
; (either in PS or JPG format)
;##############################################

;##############################################
; Original procedure written by Stefan Immler.
;
; This short IDL routine plots a light curve
; by reading in a data file called lightcurve.dat
; It start with a small subroutine that plots
; the error bars.
;
; This sample IDL routine only plots 5 data points.
; Your assignment is to plot the entire data range.
; The data are:
;
; Date L_X          L_X_err
; [days]     [cgs]        [cgs]
; 8.7550     0.3296 0.13
; 11.465     0.4525 0.17
; 14.275     0.8877 0.23
; 16.785     1.2492 0.26
; 20.076     1.4000 0.26
; 25.280     1.5023 0.24
; 29.220   1.4210   0.22
; 33.681     1.4325 0.27
; 38.459     1.1971 0.24
; 43.128     1.1777 0.27
; 47.208     0.9340 0.20
; 51.530     0.7605 0.21
; 61.873     0.5783 0.18
;
; Hints:
; 1) Add the data above to the data file.
;    Be sure to use an ASCII editor (not Word, OpenOffice).
; 2) Change the array size when reading in the file
;    reflecting the length of the actual data file.
; 3) Expand both axes so you see all data points.
; 4) Add the x-axis error bars.
; 5) Make sure that the Legend is within the plot range.
; 6) You can view the PostScript file that was created
;    by this routine using Ghostview, 'gv'.
; 7) When you are ready, e-mail the PS file (or a
;    JPG screenshot) to
;
; Stephen.T.Holland@nasa.gov
;
;##############################################

;==============================================
; Subroutine for plotting error bars
;==============================================


pro ERR_BAR

header = STRARR(2)
array = FLTARR(3,13)
OPENR, SN2008bo, 'lightcurve.dat', /GET_LUN
```

```
READF, SN2008bo, header, array
date = REFORM(array[0,*])
Lx = REFORM(array[1,*])
Lx_err = REFORM(array[2,*])

       for i = 0,12 do begin

              err_y_min = Lx(i) - Lx_err(i)
              err_y_max = Lx(i) + Lx_err(i)

              ex = [date(i),date(i)]
              ey = [err_y_min, err_y_max]

              OPLOT, ex, ey, COLOR=1, THICK=3

       endfor

end

; end subroutine

;=========================================================
; IDL program to plot lightcurve starts here:
; =========================================================

pro lightcurve

;=========================================================
; Write output to PS file:
;=========================================================

       file='lightcurve'
       filename = file + '.ps'
       set_plot, 'ps'
       device, file=filename

;==========================================================
; Read in data data:
;==========================================================

header = STRARR(2)
array = FLTARR(3,13)
OPENR, SN2008bo, 'lightcurve.dat', /GET_LUN
READF, SN2008bo, header, array
date = REFORM(array[0,*])
Lx = REFORM(array[1,*])
Lx_err = REFORM(array[2,*])

;==========================================================
; Plot axis and data:
;==========================================================

       USERSYM, [0.8,-0.8,-0.8,0.8,0.8], [0.8,0.8,-0.8,-0.8,0.8], /FILL
       PLOT, date, Lx, XRANGE=[0,70], YRANGE=[0.01,2.0], $
       XSTYLE=1, PSYM=-8, YSTYLE=1, YMINOR=5, XMINOR=5, /NODATA, $
       COLOR=1, BACKGROUND=1, $
       XTITLE='!5Age [days]!X', $
       YTITLE='!5L!l0.2-10 keV!n [10!u40!n erg s!u-1!n]!X', CHARSIZE=1.5

;==========================================================
; Plot error bars:
;==========================================================

       ERR_BAR
```

```
; Plot horizontal error bars:

      OPLOT, [8.62,8.89],   [0.3296,0.3296], LINESTYLE=0, COLOR=1, THICK=3
      OPLOT, [10.3,12.63],  [0.4525,0.4525], LINESTYLE=0, COLOR=1, THICK=3
      OPLOT, [14.04,14.51], [0.8877,0.8877], LINESTYLE=0, COLOR=1, THICK=3
      OPLOT, [16.58,16.99], [1.2492,1.2492], LINESTYLE=0, COLOR=1, THICK=3
      OPLOT, [18.66,21.47], [1.4,1.4],       LINESTYLE=0, COLOR=1, THICK=3

      OPLOT, [24.780,25.780], [1.5023,1.5023], LINESTYLE=0, COLOR=1, THICK=3
      OPLOT, [28.720,29.720], [1.4210,1.4210], LINESTYLE=0, COLOR=1, THICK=3
      OPLOT, [33.181,34.181], [1.4325,1.4325], LINESTYLE=0, COLOR=1, THICK=3
      OPLOT, [37.959,38.959], [1.1971,1.1971], LINESTYLE=0, COLOR=1, THICK=3
      OPLOT, [42.628,43.628], [1.1777,1.1777], LINESTYLE=0, COLOR=1, THICK=3
      OPLOT, [46.708,47.708], [0.9349,0.9340], LINESTYLE=0, COLOR=1, THICK=3
      OPLOT, [51.030,52.030], [0.7605,0.7605], LINESTYLE=0, COLOR=1, THICK=3
      OPLOT, [61.373,62.373], [0.5783,0.5783], LINESTYLE=0, COLOR=1, THICK=3

;=========================================================
; Plot legend:
;=========================================================

      XYOUTS, 56, 1.80, 'Swift/XRT', SIZE=1.1, COLOR=1, ALIGN=0, ORIENTATION=0
      OPLOT, [3,7], [2.905,2.905], LINESTYLE=0, COLOR=1, THICK=3

;=========================================================
; Close PS file
;=========================================================

      device, /close
      set_plot, 'x'

END
```