12.215 Homework #2   **Due Monday, November 6, 2006**

Latitude and Longitude determination.

The data needed for this homework are given below.

(a) Find the time and the value of the maximum angle between the sun and its
reflection using the data given below.
(b) Find the mean index error of the sextant (data below) (5 points)
(c) Using the mean index error for distance objects, compute the elevation angle to
the Sun at its maximum (5 points)
(d) Compute the approximate atmospheric bending contribution to this measured
elevation to the sun (15 points)
(e) Given the declination of the Sun and the in vacuum estimate of the elevation
angle to the Sun, compute the latitude of the Green building. (25 points)
(f) Given Greenwich hour angle at the Greenwich meridian crossing, compute the
longitude of the Green building (25 points)

Data for Homework:

Index errors (minutes of arc)
TH   -6.2
Dawn   -7.5
Roxane   -7.8

Measured sextant data (date Oct 25, 2006)

Hrs (EDT)	Min	Sec	Sun Deg	Sun Min
11	22	12	66	46.8
11	27	48	67	23.2
11	30	43	67	41.4
11	41	24	68	48.0
11	47	27	69	18.6
11	49	46	69	31.6
11	53	48	69	43.1
11	56	40	69	56.4
12	07	35	70	28.6
12	12	02	70	41.9
12	13	50	70	40.4
12	14	57	70	42.8
12	16	17	70	44.1

12	17	30	70	50.0
12	18	36	70	48.0
12	19	46	70	46.7
12	21	26	70	58.4
12	22	51	70	46.8
12	23	51	70	45.7
12	25	29	70	48.6
12	27	50	70	49.5
12	35	13	70	54.1
12	37	05	70	48.4
12	38	56	70	40.4
12	43	20	70	36.2
12	48	34	70	25.2
12	52	57	70	18.8
12	59	14	70	01.0
13	03	30	69	43.5

Almanac from:

http://www.tecepe.com.br/scripts/AlmanacPagesISAPI.isa/pages?date=10%2F25%2F2006

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2006 OCT. 25
------+-----------------+
      |      SUN        |
------+-----------------+
G.M.T |   GHA      Dec   |
 d  h |    °   '    °   ' |
25  0 | 183 57.7 S11 58.4 |
    1 | 198 57.7 S11 59.3 |
    2 | 213 57.8 S12 00.2 |
    3 | 228 57.9 S12 01.0 |
    4 | 243 58.0 S12 01.9 |
 W  5 | 258 58.0 S12 02.8 |
 E    |                   |
 D  6 | 273 58.1 S12 03.6 |
 N  7 | 288 58.2 S12 04.5 |
 E  8 | 303 58.2 S12 05.4 |
 S  9 | 318 58.3 S12 06.2 |
 D 10 | 333 58.4 S12 07.1 |
 A 11 | 348 58.5 S12 07.9 |
 Y    |                   |
   12 |   3 58.5 S12 08.8 |
   13 |  18 58.6 S12 09.7 |
   14 |  33 58.7 S12 10.5 |
   15 |  48 58.7 S12 11.4 |
   16 |  63 58.8 S12 12.2 |
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 17 |   78 58.9 S12 13.1 |
    |                     |
 18 |   93 59.0 S12 14.0 |
 19 |  108 59.0 S12 14.8 |
 20 |  123 59.1 S12 15.7 |
 21 |  138 59.2 S12 16.5 |
 22 |  153 59.2 S12 17.4 |
 23 |  168 59.3 S12 18.2 |
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