1. How much brighter (e.g. what is the brightness ratio) of two stars which have a difference in magnitudes of: [9]
   
   (a) $\Delta m = 5 \text{ mag}$
   (b) $\Delta m = 23.4 \text{ mag}$
   (c) $\Delta m = 0.56 \text{ mag}$

2. Which of the stars below is cooler than the Sun? [3]
   
   (a) $B-V = +0.36$
   (b) $V-I = -0.03$
   (c) $R-I = +0.47$
   (d) $V-R = +1.06$

3. What should the RA of objects be that would be ideal for observing all night during March of this year? [5]

4. Suppose you go to the HAS star party on February 22, and observe the following object $\alpha = 08h30m\,00s$, $\delta = 32^{o}\,30^{\prime}\,22^{\prime\prime}$. The latitude and longitude of Honolulu are: $\phi = 21.3^{\circ}\text{N}$, $\lambda = 157.8^{\circ}\text{W}$.
   
   (a) Is this star N or S of the celestial equator? [2]
   (b) If the observation was made at 9:30p.m. Hawaii Standard time, what UT and JD does this correspond to? [6]
(c) What was the HA of the object when you observed it? [10]

(d) What was its Airmass? [5]

(e) For approximately how many hours of the night will it be visible? You may assume that the end of twilight in the evening was at 5:45 UT and the beginning of twilight in the morning was at 15:45 UT. [5]