HW 1, #2

We use data from Bright Star Catalog, V/50 in Vizier, for this problem.

a) Sirius $m_V = -1.46$

b) the bright component is Mizar $m_V = 2.27$

d) " faint " " Alcor $m_V = 3.95$

Adding together the light of Mizar & Alcor yields an equivalent single-star magnitude of

e) $m(\text{Mizar} + \text{Alcor}) = 2.06$

The other six stars in the Big Dipper are

Alioth	$m_V = 1.77$
Dubhe	1.79
Alkaid	1.86
Merak	2.37
Phecda	2.44
Megrez	3.31

Sum of all + Mizar + Alcor = 0.02 ⟹ details

Sirius is much brighter by itself.

HW #1, #2 continued

How to add up the light from 7 stars?

Step 1: convert each star's magnitude to an intensity.

For example, Alioth has $m_V = 1.77$.

We choose an arbitrary reference magnitude of $m_V = 0.0$ – any reference value would do.

$$\frac{I(\text{Alioth})}{I(\text{ref})} = 10^{-0.4(1.77-0)}$$

$$= 0.196$$

Repeat for all 7 stars, yielding 7 intensities

0.196, 0.192, 0.180, 0.150, 0.113, 0.106, 0.047

Step 2: Add all the intensities

Sum $\cong$ 0.984

Step 3: Convert from 'intensity (relative to ref star) back to magnitude':

$$(m_{tot} - m_{ref}) = -2.5 \log_{10}\left(\frac{I_{tot}}{I_{ref}}\right)$$

$$= -2.5 \log_{10}\left(\frac{0.984}{1.0}\right)$$

$$= 0.02$$