Parallax, Distance Modulus and Stellar Distances

Name_____

Purpose:
- To provide you with necessary skills to understand the concept of stellar parallax and how this is used to determine distance
- To give you practice performing simple mathematical calculations using parallax and distance brightness

Estimated Completion Time: 45 minutes

Resources needed:
- Calculator (preferably scientific)
- Textbook
- Web access is highly desirable

Questions

1. Refer to sections 8.1,8.2 in the on-line notes. Summarize in your own words (3 sentences or less) what parallax is. Use a simple sketch to help explain the concept. (2 marks)

   Parallax is the shift in position of a star relative to more distant stars as viewed from opposite sides of Earth's orbit around the Sun. Please refer to the lecture note.

2. Star A has a parallax that is 3 times bigger than the parallax of star B. Which star is farthest from you and by what factor? (2 marks)

   Star B has the smaller parallax so is farther away (3 times)

3. Explain what a distance of 1 parsec is. How is the unit "light year" related to parsec? (2 marks)

   1 parsec is the distance at which the parallactic shift is 1". This is the same as 3.26 light years.

4. Explain in your own words what a distance modulus is and how it relates to distance. (2 marks)

   Distance modulus is the difference between apparent and absolute magnitude or $m-M$. This is related to distance via $m-M = 5\log\left(\frac{r}{10}\right)$

5. Fill in the missing information for the table shown below: (18 marks)

Star	p (")	Distance (pc)	Apparent Magnitude	Absolute Magnitude	Distance Modulus
Alnilam	.0047	212.8	1.7	-4.9	6.6
Arcturus	0.035	28.2	0	-2.25	2.25
Polaris	0.0076	131.8	2.0	-3.6	5.6
Alpha Centauri	0.797	1.3	1.28	5.71	-4.43
Mirphak	0.0064	156.3	1.8	-4.17	5.97
Mintaka	0.0047	212.8	2.5	-4.1	6.6

(Show your work below!)