Name:_____

Using Cepheid Variable Stars to Measure the Distance to a Nearby Galaxy

ASTRONOMY 106 Laboratory Worksheet due: Wednesday, 29 April

- Use a computer to access the lab at **http://astro.wku.edu/astr106/cepheidhunt/**
- Carefully read and complete the experiment as instructed. If something is not clear, please get help.
- Neatness counts. Information which is difficult to decipher will not receive credit.
- Everything turned in for a grade must be your own work. Collaboration is not acceptable as you undertake the work required to fill out this worksheet.

I. Find the Cepheids

A. Record the numbers of all the WFPC grids you visited: 26, 47_____

B. Find a minimum of nine Cepheids in the various grids of the WFPC image. For each Cepheid you locate, record its period and average apparent magnitude, m_V, in the following data table.

	Grid #	Cepheid name		period P(days)		Absolute mag. M_V	estimate of average m_V	distance modulus $m_V - M_V$
1	**47**	**C46**		**25.3**		**25.3**		
2								
3								
4								
5								
6								
7								
8								
9								

II. The distance to M100

A. The Period - Luminosity relationship

Calculate the absolute magnitudes for each Cepheid identified in Part I.B using the equation,

$$M_V = -[\, 2.76 \, (\log (P) - 1.0 \,) \,] - 4.16,$$

where P is the period, in days, for each Cepheid's variability, as recorded in the data table above. Record the value of the absolute magnitude for each Cepheid in the corresponding column of the data table.

B. The distance modulus

Using the m_V estimated for each Cepheid's light curve, calculate the quantity ($m_V - M_V$), which is referred to as the distance modulus, and record your results in the corresponding column of the data table.

Compute the average distance modulus for the Cepheids you identified. **Average($m_V - M_V$) =**_____

C. The distance to M100

Calculate the distance to M100, in units of parsecs, using the average distance modulus in the equation

$$d = 10^{\,[\,0.2\,(m_V - M_V) + 1\,]} = \_\_\_\_\_ \text{ parsecs } = \_\_\_\_\_ \text{ Mpc.}$$