

## **Phys 10 Homework 10** **(Not to be turned in, not part of your grade)**

*Assigned: Mar 11*

*Solutions provided Mar 11*

*The idea of this homework set is to help you study for the final exam. You should use it the same way you use the other homeworks as a guide to prepare for exams. Solutions are posted on the main course web page in the assigned homework section.*

*Most of these topics received more emphasis in my lectures than in the textbook.*

**10.1)** What are the three cosmological puzzles that motivate the theory of cosmic inflation? Name them and describe each using a sentence or two.

**10.2)** What aspect of the universe must you care about for the puzzles stated in 10.1) to really be “puzzles” rather than simply being “features” of the standard big bang picture of cosmology?

**10.3)**

**a)** Sketch a plot of  $\Omega(t)$ . Along the “x-axis” (time) mark an early time period as the time of “inflation” followed by a later time period for the “standard big bang” the next section showing several different curves that show typical behaviors of  $\Omega(t)$  during these periods.

**b)** Write (in a few words) what is happening to the flatness of the universe during these two periods.

**10.4)**

**a)** according to current data, what percent of the universe is in Dark Energy, Dark Matter, and “ordinary matter” (such as we actually have studied in the laboratory). *You need only give three numbers here, without explanation.*

**b)** What aspect of the Dark Energy makes it radically different than the Dark Matter and “ordinary matter”.

**10.5)** True or False (*Please give a brief explanation of your answer*)

**a)** Physicists have a very clear understanding of the Dark Energy

**b)** There are several good experiments we could do to learn more about the dark energy.