

Astronomy 340 - Assignment 5 Solutions

October 19, 2006

1

The weak anthropic principle states that “the conditions we observe in the universe must be compatible with our existence” (P157, textbook). The weak anthropic principle asserts that the universe is special because of the existence of us in it.

The strong anthropic principle states that “the initial conditions occurred because we are here; that is, our presence here and now somehow affected the initial conditions such that we could eventually arise” (P157, textbook). From the strong anthropic principle, we can say that the purpose of the universe is to create life. Everything happened after the universe was created just happened. “Each of us is here by happy accident of conditions”.

2

To ask this kind of questions is not meaningful because the question assume that the space and time are distinct from the universe itself. But time and space do not exist before the universe.

3

- a, Yes. There is no preferential direction for observer A.
- b, No. Every direction is different.
- c, No. Each location sees different structures including edges.
- d, Consistent with Copernican Principle since it does not state that there is no center but that we are simply not located there.
- e, The surface of a cylinder.

4

According to the CP all points in space are equivalent and there is no single point that is special. No center or edge.

5

The cosmological principle states that every point in the universe is equivalent to each other. It only concerns the spatial property of the universe. The perfect cosmological principle concerns both the spatial and temporal properties.

6

That the universe is homogeneous is at the largest scale of the universe. The scale of the cluster of galaxies is large comparing the radius of the Earth but still very very small comparing the scale of the universe.

7

The value of invariant quantity does not change when measured in different inertial frames. But the value of relative quantities changes.