Comments on Problem Set 3 Brad Skow

1.(i) Describe the events represented in the diagram. (ii) Describe the events that would be represented in the diagram if the arrow of time went from top to bottom instead of from bottom to top.

Most people gave good descriptions of the diagram. There was one common mistake, though. The diagram only represents one spatial dimension, so there are only two directions that rocks can move in: left and right. It was incorrect, then, to say that rock C shatters into five pieces which all move off in different directions: there are not five different directions for the rocks to move in, only two. Likewise it was incorrect (when answering part (ii)) to say that rock A and rock B split up and move in different directions. After the split they both continue moving to the left.

2. Draw a spacetime diagram of the moon orbiting the earth.

Again, most of these diagrams were good. Some diagrams had a minor flaw: they showed the moon taking a 'zig-zag' path around the sun. But the moon's orbit is (roughly) circular, so the diagram should look like an upward spiral. A zig-zag path represents the moon changing its direction of motion discontinuously: this does not happen.

3. Draw a spacetime diagram of the story of Descartes as told by Van Inwagen. Choose THREE different ways of resolving the paradox and explain how the proponents of these views would annotate the diagram.

A good answer to this question did not just discuss the paradox; it also had to explain how to annotate the diagram, or even provide separate annotated diagrams (as some people did). One clear way to annotate the diagram is to draw borders around the spacetime regions that are traced out by material objects, and then label the objects.

There was some confusion about what counted as a way of solving the paradox: the Doctrine of Arbitrary Undetached Parts, for example, is not itself a way of solving the paradox. This version of the paradox is on the handout from January 24:

1. There is something—Descartes—that occupies the same space as Descartes after t and includes a left leg before t.
2. There is something—D-minus—that occupies all the space that Descartes occupies before t, except for the subregion occupied by his left leg.
3. If there is anything that occupies that region of space before t, it occupies exactly the same space as Descartes after t.
4. There is at most one thing that occupies the same space as Descartes after t.

To solve the paradox you must deny one of these sentences. If you believe DAUP, you cannot deny 2, but you are free to deny any of the others.

4. Draw a spacetime diagram that represents the story of the Ship of Theseus. For at least THREE different spacetime regions represented in your diagram, give one reason for and one reason against the claim that this region is traced out by a ship.

Very few people understood this question correctly. There were two common misunderstandings. Some thought that the question asked them to give reasons for and against the claim that the regions they choose were traced out by the Ship of Theseus, rather than just any ship at all. Some made a more serious mistake: they thought that the question asked them to pick three times and give reasons for and against the claim that the Ship of Theseus exists at that time. Since this question is not at all the question you were supposed to answer, even decent answers to it were given low marks.

Some people chose very strange spacetime regions to use for their answer. Some chose regions in which no material objects are ever arranged in the form of a ship. It is not easy to argue that a ship traces out a region like that. Others chose instantaneous spacetime regions--regions that take up just one instant of time. But any ship that traces out an instantaneous spacetime region exists for just one instant! Some philosophers believe in such short-lived ships, but no one who chose such a region seemed aware that the existence of ships that trace out such regions is counterintuitive. (Choosing an instantaneous spacetime region was sometimes a sign that that person had misunderstood the question in the more serious way I mentioned).

To say that a ship traces out a spacetime region is to say that, at each time within that region, the ship occupies the region of space that coincides with that region of spacetime at that time, and that the ship does not exist at any time outside of that region. (Note that it makes no sense to say, as some people did, that a spacetime region traces out a ship). Take, for example, the spacetime region occupied by the original planks from the beginning of the story until the first plank is removed (shaded in the diagram below). Here is one reason to think that no ship traces out that spacetime region: a ship can survive the replacement of one plank. So even though a ship does exist at each time within the region, that very ship also exists at a later time. And if it exists at a time outside that region, then it does not trace out that region.

Finally a note on the diagrams: a good diagram should represent the six planks taking continuous paths through spacetime. If you drew some planks at one time and them some planks at another time, with no paths connecting them, then your diagram represents planks popping into and then popping out of existence in different places. While it may not be impossible for that to happen, it's not what happens in the story.

Most answers to questions 3 and 4 were not clearly written and were difficult to follow. Improving the clarity of your writing will also improve the quality of your answers.