Exoplanets Mini-tutorial

Part I: Many possible explanations for differences

One question on the exam asked how the existence of a Jupiter-sized object within 1AU of its star could be consistent with what we know about our solar system. Especially in light of our discussion of how Jupiter-sized objects form outside the "frost line."

1. Several possibilities were given in the answers people turned in:
    a. The other star is cooler than the Sun.
        i. Why would that make this new system consistent with ours?

        ii. How could this possibility be checked?

    b. The other star is smaller than our Sun.
        i. Why would that make this new system consistent with ours?

        ii. How could this possibility be checked?

    c. The other solar system formed from different material than our solar system.
        i. Why would that make this new system consistent with ours?

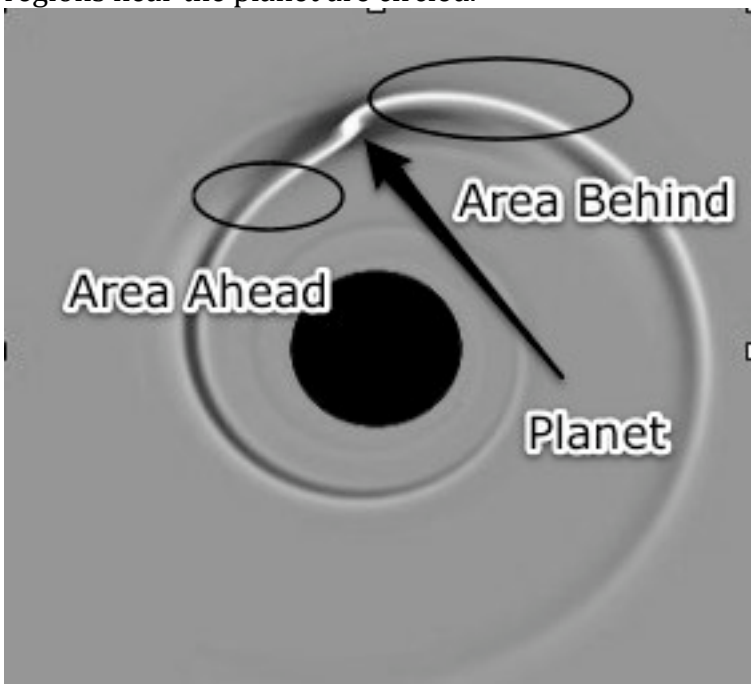
        ii. How could this possibility be checked?

    d. The Jupiter-sized planet forms far away and then moves closer to its star.
        i. Why would that make this new system consistent with ours?

        ii. How could this possibility be checked?

Part II: How planetary migration works

2. The picture below is from a computer simulation of planet formation. Two regions near the planet are circled.



   a. Which are has more mass, the area behind the planet or the area in front? The lighter a region is the more mass it has in that region.

   b. Which area's gravity pulls harder on the planet, the area in front or the area behind?

   c. Does this speed the planet up or slow it down? Explain.

   d. Does this change in speed cause the planet to spiral in, spiral out, or does it not change the orbit? Why?