

2. (10 points) Describe how the jovian planets formed.

Planetesimals accrete throughout the Solar System and form protoplanets. Beyond the frost line ($\geq 3\text{AU}$) icy planetesimals accrete onto the protoplanets, making them (the protoplanets) large enough to pull in hydrogen and helium gas from the Solar nebula. In this manner, the planets beyond the frost line became gas giants.

3. (10 points) How did the Solar System form? Describe it from the beginning until the formation of planetesimals.

A clump in a molecular cloud collapses and gives rise to the proto-Sun and an infalling disk structure. This disk contracts, heats up, spins, flattens, and eventually cools. This is the Solar nebula. As it cools, material condenses out at various distances depending on its boiling point. Metals condense closest to the newly-formed Sun, then rocks, then hydrogen compounds (ices); the bulk of the flattened, spinning disk is H & He , which always remains in gas form. Eventually, the material that has condensed, via sticking and collisions, accretes into km-sized objects known as planetesimals.