

Name: _____

Table 1 for Lab 9: Document the style of convection that you observe for different Rayleigh numbers. Consider the following questions when documenting your observations:

- Is the temperature spatially uniform or variable?
- Do you see rising or sinking?
- Do you see plumes? How large or small are the features?
- Are the sizes of the convective cells large or small? How many convective cells are there? Do the convective cells span the entire vertical layer, or are they stratified?
- Is the convective pattern stable or changing through time?

Rayleigh Number	Description of Convective Style
1e+2	Temps are uniform in horizontal strata that go from being tapered at the top in bottom with the middle being the largest strata to all being uniform thickness after 1000 time steps.
1e+3	Starts with splotches of variable temperatures, but quickly turned into horizontal strata and reacts like the convection in the first test, becoming uniform horizontal layers from cold to hotter at depth.
1e+4	Starts similarly, then two plumes form that rise about halfway up the plot before bulging horizontally until the two connect. After 1000 time steps we have two hot yellow plumes and the whole bottom half of the plot is hot, then tapers to colder temperatures at the top.
1e+5	Similar to the third instance, but there are 4 plumes initially and the middle two combine into one. The process is much faster, and the plumes rise much higher, closer to 75% to the surface. The plumes still have mushroom shape but start out as pillars. The top of the mushroom then spreads out horizontally, connecting with the plume next to it.
1e+6	Similar to 1e+5, but it moves much slower and a third plume comes up around time step 500, before combining with the original spire. The plumes are much taller and leave less than five vertical distance units above it.
1e+7	Even slower and shows movement somewhat sporadic like a lava lamp. The plumes are less mushroom like and more like spires that release splotches of heat that rise to the surface like a fire. The cold area above the plumes is now almost nothing. The heat is fairly uniform under the plumes.
1e+8	Heat is very sporadic in the beginning and then circulates around the edge of the plot until eventually the hot areas are in the top right and the cold areas are at the bottom. Then another small plume develops in the bottom and the cycle restarts. The region as a whole is much colder in this instance.
1e+9	Now there are cold plumes coming down from the top as well as hot plumes from below. The cold plumes dominate the hot ones producing upside down mushroom shapes leaving only a tiny peak of heat between the cold spires.
1e+10	Interestingly, the heat seems to start on tope of the cold before the cold spires form, then the system flips back over and the hot areas are again at the bottom. After 700 time steps there is only one cold plume in the middle coming from the surface.

1e+11	All of the heat seems to be revolving clockwise around the region in question, before settling with the heat on top of the cold. Then our plumes form from the top and bottom and the area is separated into two distance regions: a hot one on top and a cold one below. Eventually, after over 1000 time steps, the temperature regions flip again revealing on plume.
1e+12	Again, the hot region floats on top of the cold one. Then there is intense shaking within the layers as they settle and become nearly horizontal layers from hot to cold. The layers become more refined over time. There are no noticeable plumes but there seem to be separate regions, one on the left and one on the right.
1e+13	Now rotating counterclockwise at the beginning, this instance then settles out into the same near horizontal vibrating layers that become more refined over time. The shaking seems to be accelerating near the end of the simulation.