The Ideal Gas Law is

\[ p = \rho RT \]

Examine the weather map, given as Figure 1, below:

Figure 1: Sea level pressure (isobars, 2 mb intervals) and temperature (isotherms, 5F intervals), for 1600 UTC 25 February 2015
Notice the highlighted portion of the 45F isotherm, extending from point A where the pressure is 1008 mb to point B where the pressure is 1012 mb. You are going to be asked, below, to use the gas law to say something about the variation of density along the isotherm highlighted.

(a) Given the constraints of the problem, what is constant in the above equation (give me the symbols and a short one sentence explanation); (10 pts)

The gas constant, R, and temperature, T, are constant. Temperature is constant because the gas law is evaluated, in this case, along an isotherm. Along an isotherm, by definition, temperature is constant.

(b) At which location, A or B is the density greater? Provide at least a COMPLETE one or two sentence explanation.(40 pts)

For this problem, the gas law reduces to an expression in which the temperature and gas constant are together a constant, k.

\[ p = \rho k \]

Thus, pressure and density are directly proportional. If pressure and density are directly proportional, the density is greatest at point B, since at that point pressure is higher.