#2. Using the formula for escape velocity that I gave to you in the first week or two of class (and which appears as the second equation on page 328), along with the mass (8.9 \(10^{22}\) kg) and radius (1.8 \(10^{6}\) m) of Io, you can easily calculate that the escape velocity for Io is 2.5 km/s. Then, using the third equation on page 328, you can calculate the speeds that \(H_2O\) and \(SO_2\) would have at the surface of Io, where the temperature is about 120 K: \(V_{H_2O} \approx 0.4\) km/s (using a molecular weight of 0.018 kg/mole for \(H_2O\)) and \(V_{SO_2} \approx 0.2\) km/s. Finally, using the last equation on page 328, you see that it is much more likely that \(H_2O\) will escape from Io than \(SO_2\), because 0.4 is very close to 0.2 \(\times\) 2.5 = 0.5 km/s, while 0.2 is not very close.