4. For $T = 28^\circ\text{C}$ and $\text{RH} = 75\%$, $W_s = 24\ \text{g kg}^{-1}$ and $W = 18\ \text{g kg}^{-1}$
- $LCL = 935\ \text{hPa}$
- $W_e(LCL) = 18\ \text{g kg}^{-1}$
- At 700 hPa, $W_s = 12.5\ \text{g kg}^{-1}$, and $W_{eq} = 18 - 12.5 = 5.5\ \text{g kg}^{-1}$
- If 75% of liquid rains out, then $W_{eq\ new} = (0.75)5.5 = 1.4\ \text{g kg}^{-1}$

- Total water mixing ratio is $12.5 + 1.4 = 13.9\ \text{g kg}^{-1}$
- New LCL is $755\ \text{hPa} \sim 2400\ \text{m}$
- Upon dry adiabatic descent to 1000 hPa, $T = 39^\circ\text{C}$

5. For $T = 21^\circ\text{C}$ and $p = 800\ \text{hPa}$ and $\text{RH} = 30\%$
- $W_s = 20\ \text{g kg}^{-1}$ $\Rightarrow$ $W = 0.3 \times 20 = 6\ \text{g kg}^{-1}$
- Go to 650. $T = 4^\circ\text{C}$. no saturation
- If air cools to 3$^\circ\text{C}$, saturation occurs when $W = W_s = 7.3\ \text{g kg}^{-1}$
- Thus, $7.3 - 6 = 1.3\ \text{g kg}^{-1}$ of water was added.
- Air descends dry adiabatically to 800 hPa

- \[ T = 20^\circ\text{C} \]
- New $W_s = 18.5\ \text{g km}^{-1}$
- $100 \times \text{R.H.} = \frac{7.3 \times 100}{18.5} = 39\%$