CHEM 112 - Tutorial 9

Question 1 (4 marks). Use data from the table below to answer the following questions.

Liquid	μ, Debye	α, 10^{-25} cm^3	% Dispersion	% Dipole	$\Delta_{vap}H$, kJ mol^{-1}	Boiling Point, °C
Dimethyl ether, $(CH_3)_2O$	1.30	52.9	84.6	15.4	18.5[b]	−24.8[c]
Diethyl ether, $(CH_3CH_2)_2O$	1.10	102	96.3	3.7	27.1	34.5
Methanol, CH_3OH	1.70	32.9	47.6	42.4	37.4	64.6
Ethanol, CH_3CH_2OH	1.69	54.1	69.8	30.2	42.3	78.3
Water, H_2O	1.85	14.5	13.8	86.2	44.0	100

a) Explain why ethanol has a higher boiling point than methanol even though their dipole moments are about the same.

b) What properties of the two molecules account for this difference?

Question 2 (2 marks). In which of the following systems will hydrogen bonding play an important role:

CH_3NH_2 $(CH_3)_2CO$ CH_3Cl CH_3OH

Use Lewis structures to explain your answer.

Question 3 (4 marks). The vapour pressure of an unknown compound from the table above at 0°C is 0.2623 atm. If the vapour pressure at 25°C is 0.7135 atm, what is the normal boiling point of the compound? Which compound from the table above is this?