Exercises on Properties of Hydrocarbons

1. Find the moles in a 500-ft^3 tank of ethane at 100 psia and 100°F. Find also the volume at standard conditions (520 R, 14.7 psi). Assume ideal gas behaviour.
2. Find Z given the following data:

    - Gas specific gravity = 0.665
    - Reservoir temperature = 213°F
    - Reservoir pressure = 3250 psia
    - Ppc=663 psia
    - Tpc=372 °R

3. Find specific gravity and Z given the following data:

(1) Component	(2) Component, mole fraction	(3) Molecular weight	(4) p_c	(5) T_c
Methane	0.8612	16.04	673	343
Ethane	0.0591	30.07	708	550
Propane	0.0358	44.09	617	666
Butane	0.0172	58.12	550	766
Pentanes	0.0050	72.15	490	846
CO_2	0.0010	44.01	1070	548
N_2	0.0207	28.02	492	227
Total	1.0000			

4. Calculate the volume 1 lb-mol of ideal gas will occupy at

    A. 14.7 psia and 60°F
    B. 14.7 psia and 32°F
    C. 15.025 psia and 60°F

5. A 500-ft^3 tank contains 10 lb of methane and 20 lb of ethane at 90°F. There are 1.292 moles in the tank ($n_t = \frac{m_1}{m_{w1}} + \frac{m_2}{m_{w2}} = \frac{10}{16} + \frac{20}{30} = 1.292$)
    1. What is the pressure of the tank in psia?

    2. What is the molecular weight of the mixture?
    3. What is the specific gravity of the mixture?
6. A 50-ft^3 tank contains gas at 50 psia and 50°F. It is connected to another tank that contains gas at 25 psia and 50°F. When the valve between the two is opened, the pressure equalizes at 35 psia at 50°F. What is the volume of the second tank?
7. A high-pressure cell has a volume of 0.330 cu ft and contains gas at 2500 psia and 130°F, at which conditions its deviation factor is 0.75. When 43.6 SCF measured at 14.7 psia and 60°F were bled from the cell through a wet test meter, the pressure dropped to 1000 psia, the temperature remaining at 130°F. What is the gas deviation factor at 1000 psia and 130°F?