Solution of problem 2.7.6 of the reader

Part a). The computation of the molecular weights is simple:

SiO_2	60
Al_2O_3	102
CaO	56
Wo	116
Py	218
Qu	60

Part b). The mineral $CaSiO_3$ is composed of CaO and SiO_2 in the weigth ratio $56:60$, the mineral $CaAl_2SiO_6$ is composed of CaO, Al_2O_3, SiO_2 in the weight ratios $56:102:60$. The mineral SiO_2 is entirely composed of SiO_2. The contribution to the weight percentage of SiO_2 coming from the different minerals is equal to

$$\frac{60}{116}x_1 + \frac{60}{218}x_2 + x_3 = 63.8$$

Similarly for Al_2O_3 we get

$$\frac{102}{218}x_2 = 14.0$$

and for CaO we get

$$\frac{56}{116}x_1 + \frac{56}{218}x_2 = 22.2$$

These are three linear equations in three unknowns. The second equation gives us $x_2 = 14.0 \times 218/102 = 29.922$ Using this in the third equation gives us

$$x_1 = \frac{116}{56}(22.2 - \frac{56}{218}x_2) = 30.064$$

The first equation then gives us

$$x_1 = 63.8 - \frac{60}{116}x_1 - \frac{60}{218}x_2 = 40.014$$

As a check you can add the percentages and verify that they add up to 100.000.