Problem set#3
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1- The following table lists measurements of volumetric water content with absolute values of the corresponding soil water pressure head for a soil sample with a bimodal pore size distribution.

Matric head (cm)	1	10	20	50	100	150	200	250	300	400	500	700	1000	2000	4000	6000
Water content ($cm^3\ cm^{-3}$)	0.440	0.410	0.401	0.397	0.395	0.393	0.390	0.386	0.382	0.370	0.356	0.323	0.271	0.155	0.073	0.046

a- Use the RETC model to fit α, n and θ_r of the van Genuchten soil water retention model.

b- Use the RETC model to fit α, n and θ_r of the Brooks and Corey soil water retention model.

c- Use the MS Excel to fit α_1, α_2, n_1, n_2, w_1 and θ_r of the following bimodal soil water retention model:

$$\frac{\theta\text{-}\theta_r}{\theta_s-\theta_r} = S_e = w_1(1+(\alpha_1 \mid h_m \mid)^{n_1})^{-m_1} + w_2(1+(\alpha_2 \mid h_m \mid)^{n_2})^{-m_2}$$

Note that $w_1 + w_2 = 1$, $0 \le w_1 \le 1$, $0 \le w_2 \le 1$, m_i=1-(1/n_i). Also, assume that θ_s is known and equal to the water content value in the above table for h=1 cm.

2- List the fixed and optimized parameter values, and plot the measured and fitted data (use a log-scale for the h-axis). Discuss results.

3- Repeat (1-c) and (2), but instead of the van Genuchten model, use a bimodal lognormal soil water retention model.