Assignment 4
VE414
Due: 11/30/2021

1.

In a genetic linkage experiment, 197 animals are randomly assigned to four categories according to the multinomial distribution with cell probabilities $\pi_1 = \frac{1}{2} + \frac{\theta}{4}$, $\pi_2 = \frac{1-\theta}{4}$, $\pi_3 = \frac{1-\theta}{4}$, and $\pi_4 = \frac{\theta}{4}$. The corresponding observations are $y = (y_1, y_2, y_3, y_4) = (125, 18, 20, 34)$.

(a) Derive and implement an EM algorithm to estimate θ.

(b) Plot the observed data log-likelihood function $\ell(\theta \mid y)$ for $\theta \in (0, 1)$. Compare the maximum of this function with your EM estimate.

2.

Finish up the code in HW4_part2.zip and report your result.