HW for 2019-06-05
(due: 2019-06-12)

1: How many factors? The (economy) pivoted QR factorization is used for factor selection least squares; we compute

\[ \text{API} = QR \]

and then only fit based on the first \( k \) columns of \( \Pi \). Given \( Q \) and \( b \), write a code to compute the mean LOOCV statistic

\[ \text{LOOCV} = \frac{1}{m} \sum_{i=1}^{m} r_{(-i)}^2 \]

for \( k = 1, \ldots, n \). Ideally, your code should take \( O(mn) \) time.

Note: You really do only need \( Q \) and \( b \)!

2: Maximum likelihood for least squares Consider the statistical model

\[ y = Ax + e \]

where \( e \sim \mathcal{N}(0, \sigma^2 I) \). Derive the maximum likelihood estimates for \( x \) and \( \sigma^2 \) given observed data \( y \).