1. Implement the following into `chernoff.m`:

   ```matlab
   function P = chernoff(p, C)
   
   With given \( p_j := P(X_j = l), \quad j = 1, \ldots, J \) calculate the Chernoff bound
   \[
   P \left( \sum_{j=1}^{J} X_j > C \right) \leq \min \left\{ e^{\frac{\sum_{j=1}^{J} \mu_j(s)}{s_{\text{opt}} C} - s_{\text{opt}} C} ; 1 \right\},
   \] where \( s_{\text{opt}} = \inf_{s} \left( \sum_{j=1}^{J} \mu_j(s) - sC \right) \) and
   \[
   \mu_j(s) = \log \left( \sum_{l=1}^{L} e^{sp_j} \right).
   
   First solve the optimization problem with exhaustive search on the \( 0 < s \leq 1 \) interval.
   
   For the sake of simplicity, let’s assume that \( l = 1, \ldots, L \), i.e. the domain corresponds to
   the vector indices, therefore \( p \) is represented as a \( J \times L \) matrix.
   
   (4 points)
   
2. Load `p3.mat` into workspace and calculate the Chernoff bound for \( p \) in case of
   different \( 1000 \leq C \leq 1400 \) parameters. Plot the results.
   
   (1 point)