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
   
   \[
   P\left( \sum_{j=1}^{J} X_j > C \right) \leq \min \left\{ e^{s \inf_{s \in [0,1]} \left( \sum_{j=1}^{J} \mu_j(s) - s \mu C \right)} ; 1 \right\} ,
   \]
   
   where \( s_{opt} := \inf_{s \in [0,1]} \left( \sum_{j=1}^{J} \mu_j(s) \right) - s C \) and

   \[
   \mu_j(s) = \log \left( \sum_{l=1}^{L} e^{s p_j} \right).
   \]
   
   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 `p2.mat` into workspace and calculate the Chernoff bound for \( p \) in case of
   different \( 600 \leq C \leq 800 \) parameters. Plot the results.

   (1 point)