

name : \_\_\_\_\_

section : 105

GSI : Charles Wang

(2 pts) Circle True or False. (+1 for correct, 0 for blank, -1 for incorrect)

1. (True False) The central limit theorem says that the average of any random variables is approximately modelled by a normal distribution.
2. (True False)  $E(X_1X_2) = E(X_1)E(X_2)$  for any random variables  $X_1, X_2$ .

(10 pts) For the following, you must **justify** your answer to receive credit. (Showing your work counts as justification.)

3. Let  $X_1, X_2$  be independent coin flip random variables (i.e.  $X_1 = X_2 = 1$  for heads, and  $X_1 = X_2 = 0$  for tails).
  - (a) (3pts) Compute the PMFs for these discrete random variables. Are  $X_1, X_2$  iid?

(b) (3pts) Compute  $E(X_1 + X_2)$ .

(c) (4pts) Does it make sense to apply the central limit theorem to approximate  $\bar{X} = \frac{X_1+X_2}{2}$ ? Why or why not?