

Name: _____,

I.D. No.: _____.

1. (10 pts.) Consider the example that flipping a fair coin with outcomes Head or Tail. we are interested in estimating θ , the probability that the outcome is Head. In general, let θ be the parameter that we are interested in. Let $\hat{\Theta}$ and $\hat{\theta}$ denote the corresponding estimator and estimate of θ , respectively. Let $se(\hat{\Theta})$ be the standard error of $\hat{\Theta}$.

Let X_1, X_2, \dots, X_n be raw data used to estimate θ . (hint: X_i is 1 or 0 when using MS Excel to generate n data)

- (a) Distinguish $\hat{\Theta}$ and $\hat{\theta}$
- (b) Write $\hat{\Theta}$, $\hat{\theta}$, and $se(\hat{\Theta})$ as functions of X_1, X_2, \dots, X_n .

2. (10 pts.) Continue the example in Problems 1. Suppose that we press “F9” m time. So that we have $X_i^{(j)}, j = 1, 2, \dots, m; i = 1, 2, \dots, n$ data. Let $\bar{X}^{(1)}, \dots, \bar{X}^{(m)}$ be the sample mean of m th replication. That is, $\bar{X}^{(j)} = \sum_{i=1}^n X_i^{(j)} / m, j = 1, 2, \dots, m$. Write $\hat{\Theta}$, $\hat{\theta}$, and $se(\hat{\Theta})$ as functions of $\bar{X}^{(1)}, \dots, \bar{X}^{(m)}$.