

## STAT 400 Discussion 7

1. An aerospace company is mass producing titanium panels for a prototype space elevator. Since the size of the panels is critical to the design, the company wants to determine if they are mass producing the panels of the correct size, on average. The company randomly selects 30 panels of the assembly line and records the area of the outer face in square inches. The average and standard deviation of the sample were recorded as 64.01 and .37. Construct an appropriate 98% confidence interval for the true average size of the panels.
2. After showing your interval to the team, they suggest that a more precise interval might be more helpful. They suggest you collect another sample of an appropriate size such that you can estimate the mean within .1. Assume that the standard deviation of the population is .37 and we again use 98% confidence.

3. Suppose  $X_1, X_2, \dots, X_n$  are iid with mean  $\theta$  and variance  $\theta$ .

Now Lets suppose that we have the following estimators:

$$\hat{\theta}_1 = X_1 + X_2^2$$

$$\hat{\theta}_2 = X_4 + \frac{3X_5}{5}$$

$$\hat{\theta}_3 = \frac{\bar{X}}{2}$$

- (a) Find the Bias of each estimator
  - (b) Find the Variance of  $\hat{\theta}_2$  and  $\hat{\theta}_3$  (Note, not enough info to solve for  $\hat{\theta}_1$ )
4. We would like to calculate MLE and MOM estimators for a discrete distribution. Assume that  $f(x)$  follows the distribution in the table below

X	1	2	3
P(X)	$\theta/2$	$\theta/2$	$1 - \theta$

- (a) Find the MOM for  $\theta$
  - (b) Find the MLE for  $\theta$