

## Problem Set 4 Key

Chapter 4: 1, 2, 3, 5, 7, 10,

**2**

- (a)  $\hat{p}_{treatment} = 45/69 \approx 0.65$   
 $\hat{p}_{control} = 30/34 \approx 0.88$
- (b) i.  $H_0 : \hat{p}_{treatment} - \hat{p}_{control} = 0$   
 $H_A : \hat{p}_{treatment} - \hat{p}_{control} \neq 0$   
ii. 28, 75, 69, 34, 0, less than our observed difference.
- (c) The difference that we observed was  $0.65 - 0.88 = -0.23$ , which is less than any of the simulated differences. This suggests that transplants are an effective treatment.

**10**

- (a)  $H_0 : p_{success} = 0.31$   
 $H_A : p_{success} = 0.40$
- (b) One possibility: take 100 cards and write “success” on 31 of them and “failure” on the remaining 69. Shuffle the cards, deal out 30 of them, and record the proportion that have “success” on them,  $\hat{p}_{sim}$ . Repeat this process many many times. Count the proportion of  $\hat{p}_{sim}$ s that equal or exceed 0.40 and multiple this proportion by two for a two-tailed p-value.
- (c) Two-tailed p-value:  $\approx 0.46$ . Considering how consistent this data is with a true success rate of 0.31, we fail to reject the null hypothesis.
- (d) This is an inappropriate statement. This analysis does not establish that the clinic does not have a success rate of 0.40. They may well have a higher success rate, but with a sample size of only 30, this success rate could also have been observed if their true success rate was no different than the national average.