

## Homework #5 Solutions

( out of 50 total points)

### Problem 5.1

a)  $E(X) = -5 * .579 + 5 * .347 + 10 * .069 + 60 * .005 = -.17$  ( 2 points)

$$SD(X) = \sqrt{(-5 + .17)^2 * .579 + (5 + .17)^2 * .347 + (10 + .17)^2 * .069 + (60 + .17)^2 * .005}$$
$$= 6.930 \text{ ( 2 points)}$$

$$\Pr( X > 0 ) = .347 + .069 + .005 = .421 \text{ (2 points)}$$

b)  $E(\bar{X}) = -.17$  ( 2 points)

$$SE(\bar{X}) = \frac{SD(X)}{\sqrt{n}} = .693 \text{ ( 2 points)}$$

c) Normal Distribution, Central Limit Theorem (2 points)

d) For 100 bets, first standardize 0 using  $Z = \frac{0 + .17}{.693} = .25$ , then calculate

$$\Pr(\bar{X} > 0) = .401 \text{ ( 4 points total, 2 for standardizing and 2 for probability)}$$

e) **For 1000 bets,**

$$E(\bar{X}) = -.17 \text{ ( 2 points)}$$

$$SE(\bar{X}) = \frac{SD(X)}{\sqrt{n}} = .219 \text{ ( 2 points)}$$

$$Z = \frac{0 + .17}{.219} = .78 \text{ ( 2 points)}$$

$$\Pr(\bar{X} > 0) = .218 \text{ ( 2 points)}$$

**For 5000 bets,**

$$E(\bar{X}) = -.17 \text{ ( 2 points)}$$

$$SE(\bar{X}) = \frac{SD(X)}{\sqrt{n}} = .098 \text{ ( 2 points)}$$

$$Z = \frac{0 + .17}{.098} = 1.73 \text{ ( 2 points)}$$

$$\Pr(\bar{X} > 0) = .042 \text{ ( 2 points)}$$

**For 10000 bets,**

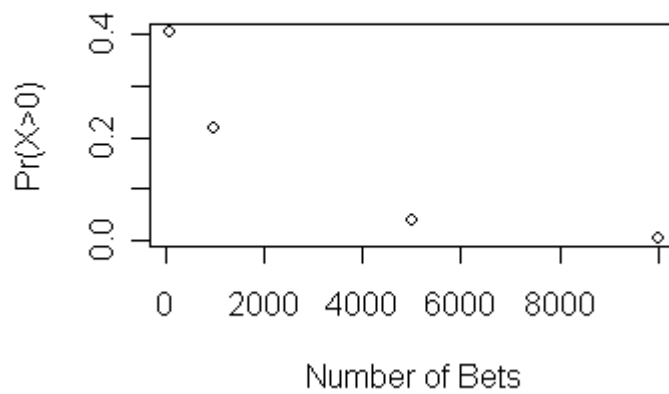
$$E(\bar{X}) = -.17 \text{ ( 2 points)}$$

$$SE(\bar{X}) = \frac{SD(X)}{\sqrt{n}} = .069 \text{ ( 2points)}$$

$$Z = \frac{0 + .17}{.069} = 2.46 \text{ ( 2 points)}$$

$$\Pr(\bar{X} > 0) = .007 \text{ ( 2 points)}$$

f)



This graph shows that as you increase the number of bets, the probability of making a positive return decreases. ( 4 points total, 2 points for graph and 2 points for describing the graph)

### **Problem 5.2**

$$\text{a) } se(\bar{x}_1 - \bar{x}_2) = \sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}} = \sqrt{\frac{1.82^2}{53} + \frac{1.53^2}{60}} = .3186 \text{ ( 2 points)}$$

$$\text{b) } (7.90 - 4.30) \pm 2 * .3186 \\ = (2.96, 4.24) \text{ ( 2 points)}$$

c) As this interval is well away from 0, sexual content seems to make a difference. The true mean number of correctly remembered brands under these conditions is likely to be greater when sexual content is present by somewhere between 3 and 4.2 than when it is absent. ( 2 points)