

**Part II – Free Response: Show all work on the answer sheet. Write clearly and completely.**

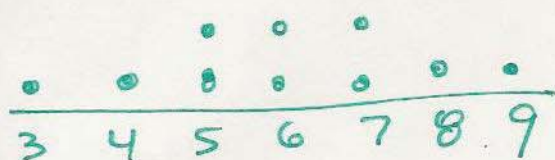
1. Consider the following set of numbers as a population: {2, 4, 6, 8, 10}
  - a) Show all possible samples of size 2 from this population (there should be 10).
  - b) Construct a histogram of the means of the samples found in part **a**.
  - c) What is the mean of the histogram in part **b**?
  - d) Explain why the result in part **c** should not be a surprise.
  
2. A study of college freshmen's study habits found that the time (in hours) that they use to study each week varies with a mean of 7.2 hours and a standard deviation of 5.3 hours. Additionally, this distribution displays a skew to the right. The student newspaper at a large university will survey a random sample of 50 freshmen at their school for the purpose of comparing to this published data. Consider these 50 an SRS of all college freshmen.
  - a) What is the mean and standard deviation for the sampling distribution for this sample?
  - b) Is it safe to assume that the sampling distribution in part **a** will be approximately normal? Explain.
  - c) Find the probability that the newspaper study will result in a mean number of hours used to study that is more than 8.5.
  
3. Thirty-five percent of American adult males suffer from Male Pattern Baldness (MPb). An SRS of 400 American males is chosen for a survey on the psychological effects of baldness.
  - a) Justify the use of a normal approximation for the sampling distribution of the proportion of males in the sample that suffer from MPB.
  - b) Find the mean and standard deviation of the sampling distribution described in part **a**.
  - c) What is the probability that fewer than 30% of the sample suffers from MPB?

Free Response (Show all necessary work. Be sure to communicate clearly and completely)

1. (a)

2, 4	$\bar{x}$ 3	4, 6	$\bar{x}$ 5	6, 8	$\bar{x}$ 7	8, 10	$\bar{x}$ 9
2, 6	4	4, 8	6	6, 10	8		
2, 8	5	4, 10	7				
2, 10	6						

(b)



(c)  $\bar{x} = 6$

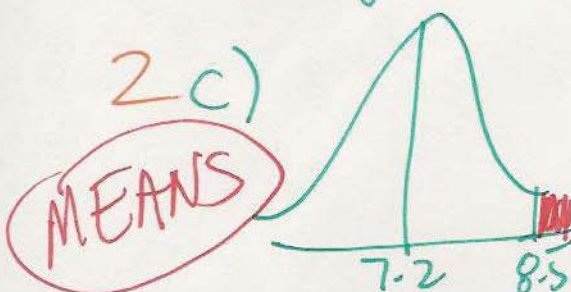
(d) Mean of all samples will equal the mean of the population (6)

2.  $\mu = 7.2$ ,  $\sigma = 5.3$ ,  $n = 50$

(a)  $\mu = 7.2$ ,  $\sigma = 5.3/\sqrt{50} = .7485$

(b) Yes, because  $n = 50 \geq 30$  (large sample size)  
(Central Limit Theorem)

(c)  $z = \frac{8.5 - 7.2}{.7485} = 1.73$



So  $p = .0418$

3.  $n = 400$ ,  $p = .35$

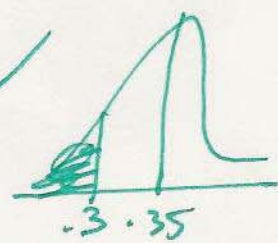
(a) POT1: Pop of Am. adult males  $> 10 \cdot 400 \checkmark$

POT2:  $np = 400(.35) = 140 \geq 10 \checkmark$

$n(1-p) = 400(.65) = 260 \geq 10 \checkmark$

(b)  $\mu = p = .35$

(c)



$\sigma = \sqrt{\frac{p(1-p)}{n}} = \sqrt{\frac{(.35)(.65)}{400}} = .024$

$z = \frac{.3 - .35}{.024} = -2.08$

So  $p = .0188$

(PROPS)