GBS 221
TROLLEN **EXAM 2 SPRING '97** **NAME_____________**

1. [15 pts] Complete each statement by circling the best answer in the brackets.

   a) The parameter(s) which define a specific Binomial distribution are **[** m **and** s **| n and p |** m **| a and b]**.

   b) When estimating a population proportion, as the sample size increases, the risk of sampling error: **[increases | decreases]**.

   c) The dispersion of the sampling distribution of the mean is **[greater than | less than | the same as]** the dispersion of the sampled population itself.

   d) When the confidence coefficient increases, the confidence interval **[narrows | widens | is unaffected]**.

   e) When constructing a confidence interval for the proportion, the confidence level represents the proportion of intervals which would contain **[p |** $\bar{p}$ **|** m **]**.

2. [4 pts] Soar Airlines historical records show that the number of passenger "no-shows" varies from flight to flight. The table below describes the most recent 40 flights on the 8:00 AM Denver-to-Phoenix flight. Based on these figures, what is the expected value for the number of no-shows?

# no of shows	frequency
0	3
1	6
2	10
3	17
4	4

3. [4 pts] When is it appropriate to use the Binomial distribution?

4. [4 pts] What does the *standard error of the mean* represent?

5. [12 pts] The ticket prices paid by the passengers on the April 11, 1997, 8:00 AM Denver-to-Phoenix flight are normally distributed with mean=$320 and standard deviation=$48.55.

   a) What is the probability that a randomly selected ticket cost less than $250?

   b) What price defines the *cheapest* 7% of tickets?

   c) A sample of 50 passengers is selected. What is the probability that the ***average*** ticket price exceeds $300?

6. [8 pts] During weekday mornings, Soar Airlines receives an average of 15 reservation calls per hour. Assuming reservation calls are independent:

   a) determine the probability that no more than 2 reservation calls occur in a randomly-selected hour.

   b) determine the probability that more than 12 reservation calls occur in a randomly-selected half-hour.

7. [13 pts] Soar estimates that there is a 5% chance that any given piece of checked luggage will be mishandled. Assuming this is true:

   a) use the appropriate ***formula*** to calculate the probability that no bags will be mishandled out of 8 randomly-selected bags. Show work.

   b) use the appropriate ***table*** to determine the probability that no more than 2 in a randomly-selected group of 10 bags will be mishandled.

   c) A government watch-dog group placed a bag on each of 200 randomly-selected flights. What is the probability that fewer than 7% mishandled bags result in this sample?

8. [22 pts] In a recent survey of 607 adults, 352 indicated that they favor federal regulation of airlines.

   a) Construct a 92% CI for the true proportion of adults who support airline regulation.

   b) What is the *precision* of your interval? ________

   c) At the same 92% confidence level, how large a sample should be taken to be within 1% (either way) of the true proportion favoring regulation?

9. [18 pts] Soar wants to estimate the mean weight of checked baggage. Twenty (20) bags were randomly selected and weighed. The mean weight was 45.7 pounds with a standard deviation of 11.2 pounds.

   a) Construct a 99% CI for the true mean weight of checked bags.

   b) Interpret your interval.

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A) n & p B) DECREASED, SINCE $\sigma_{\bar{p}} = \sqrt{\frac{p(1-p)}{n}}$

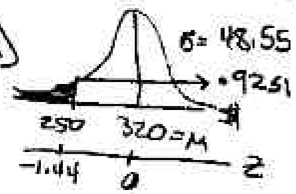
c) Less than (σ vs. $\frac{\sigma}{\sqrt{n}}$) d) WIDENS e) p

2) $E(\text{no shows}) = \sum XP(X) = (0 \times \frac{3}{40}) + (1 \times \frac{6}{40}) + (2 \times \frac{10}{40}) + (3 \times \frac{17}{40}) + (4 \times \frac{4}{40}) = \underline{2.325}$

3) WHEN NEED TO DETERMINE PROB OF A GIVEN # OF SUCCESSES OCCURING OVER A SERIES OF IDENTICAL TRIALS WHICH EACH HAVE 2 MUTUALLY EXCLUSIVE OUTCOMES & A CONSTANT PROBABILITY OF SUCCESS.

4) EITHER (1) THE DISPERSION OF THE POSSIBLE VALUES FOR THE SAMPLE MEAN FOR A SPECIFIC SAMPLE SIZE OR (2) INDICATES THE RISK OF SAMPLING ERROR WHEN USING $\bar{X}$ TO ESTIMATE μ.

5) A)

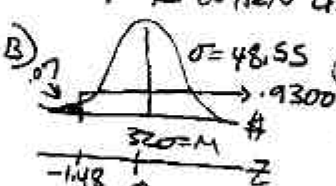


$Z = \frac{250-320}{48.55} = -1.44$

AREA FOR Z is .9251

∴ TAIL AREA = (.0749)

B)

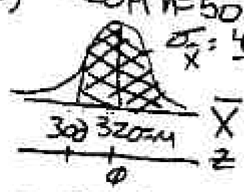


Z of -1.48 provides AREA closest to .9300

$-1.48 = \frac{X-320}{48.55}$

X = (248.15)

c) SDOM n=50



$\sigma_{\bar{x}} = \frac{48.55}{\sqrt{50}} = 6.866$

$Z = \frac{300-320}{6.866} = -2.91$

AREA for Z is (.9982)

6A) $P_P(X \leq 2 \mid \mu = 15) = (0)$ (from table)

B) $P_P(X > 12 \mid \mu = 7.5) = .0211 + .0113 + \ldots + .0001 = (.0427)$

7A) $P_B(X=0 \mid n=8, p=.05) = \frac{8!}{0!(8-0)!} .05^0 .95^8 = (.6634)$

B) $P_B(X \leq 2 \mid n=10, p=.05) = .9885$

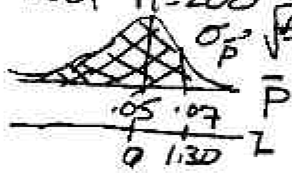
c) $\text{PROB}(\bar{p} < .07 \mid n=200, p=.05) = ?$

$np \geq 5 \rightarrow 200(.05) = 10$ ✓

$n(1-p) \geq 5 \rightarrow 200(.95) = 190$ ✓

SDOP n=200

$\sigma_{\bar{p}} = \sqrt{\frac{.05(.95)}{200}} = .0154$



$Z = \frac{.07-.05}{.0154} = 1.30$ AREA for Z is (.9032)

8A) 92% CI for p $= \bar{p} \pm \overset{\vee}{Z}(s_{\bar{p}})$

$= .58 \pm 1.75(.02)$

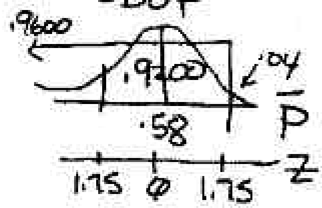
$= .58 \pm .035$

$= .545$ to $.615$

$\bar{p} = \frac{352}{607} = .58$

$s_{\bar{p}} = \sqrt{\frac{.58(.42)}{607}} = .02$

SDOP



B) PRECISION = UCL − LCL

$= .615 - .545 = .07$

C) $n_{MIN} = \frac{1.75^2(.58)(.42)}{.01^2} = 7460.25 \rightarrow 7461$

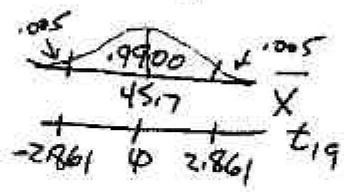
9A) 99% CI for M $= \bar{X} \pm t_{19} s_{\bar{X}}$

$= 45.7 \pm 2.861\left(\frac{11.2}{\sqrt{20}}\right)$

$= 45.7 \pm 7.17$

$= 38.53$ to 52.87

SDOM n=20
use t_{19} since σ unk



B) SOAR can be 99% confident that the true mean WEIGHT OF A CHECKED BAG IS BETWEEN 38.53 AND 52.87 pounds.

SCORES (100 poss)
95
92
92
91
90
89
86
85
84
79
69
67

NOTE! QUESTION 7c WAS MODIFIED FROM ITS ORIGINAL FORM TO BETTER PARALLEL OUR CURRENT TEXTBOOK.