FORM Z FORM Z FORM Z

1. The most recent enrollment statistics for the Los Angeles Unified School District revealed that 71% were identified as "Hispanic", 10% as "Non-Hispanic White", 12% as "Black" or "African American and the remainder as "All Others". A recent survey of excellent quality conducted by UCLA on 225 students in the Los Angeles Unified School Districted revealed that 6% were "Asian"

a. What is the chance that between 5% and 8% of students in a sample of 225 will be identified as "All Others"? (10 points)

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others	Not
1	0
.07	.93

5% 7% 8%

EV = 7%

$$SE = \frac{\sqrt{225} \times \sqrt{.07 \times .93}}{225} \times 100 = 1.7\%$$

$$\frac{5-7\%}{1.7\%} = -1.18 \rightarrow 76.99$$

$$\frac{8-7}{1.7} = .588 \rightarrow 45.15$$

$$\frac{76.99 + 45.15}{2}$$

$\boxed{61.07\%}$

b. If the sample size were 400 instead of 225 it would (circle one to fill in the blank) the standard error for the sample count of "All Others" students (4 points)

Increase Decrease Not be enough information to calculate

c. Can you construct a 90% confidence interval for the percentage of "Asian" students in the Los Angeles Unified School District? (circle one)

YES NO

If yes, please construct it in the space below, if no, please explain why this is not possible. (4 points)

$$SE = \frac{\sqrt{225} \times \sqrt{.06 \times .94}}{225} \times 100 = 1.58\%$$

$1.65 \times 1.58\% = 2.607\%$

$\boxed{6\% \pm 2.607\%}$

d. (continuing part c) Suppose it is possible to calculate a confidence interval. If the level of confidence were changed to 80% instead of 90% it would (circle one to fill in the blank) the width of any confidence interval from the sample information (4 points)

Increase Decrease Not Affect

e. What percentage of samples of size 225 will have fewer than 23 "Black or African American" students? (5 points)

EV% = 12%

$$\frac{23}{225} = .102$$

B	NB
1	0
.12	.88

10.2% 12%

$$SE = \frac{\sqrt{225} \times \sqrt{.12 \times .88}}{225} \times 100 = 2.17\%$$

$$\frac{10.2\% - 12\%}{2.17\%} = -0.829 \rightarrow 60.47$$

100 -

$$\frac{100 - 60.47}{2} = \boxed{19.765\%}$$

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2. Some friends take you to a casino and you are confronted with two games.

GAME A works like this: you can bet \$8 on a number, and if your number comes up, you win \$11, if not, you lose your \$8. Your number comes up 35% of the time.

GAME B works like this: you can bet \$3 on a number, and if your number comes up, you win \$2, if not, you lose your \$3. Your number comes up 55% of the time.

a. Please construct box models for each game in the space below. Please label them clearly so we know which represents GAME A and which represents GAME B. (8 points)

Game A

W L

+11 -8

.35 .65

Game B

W L

+2 -3

.35 .45

b. Please calculate the box average and box standard deviation for each game. Again please label them clearly so we know which is which. (6 points total)

Game A

box average: $.35(11) + .65(-8) = \boxed{\$\,{}^{-}1.35}$

box SD = $(11 - {}^{-}8)\sqrt{.35 \times .65} = \boxed{\$\,9.06}$

Game B

box average = $.55(2) + .45(-3) = \boxed{\$\,{}^{-}0.25}$

box SD = $(2-3)\sqrt{.55 \times .45}$

$= \boxed{\$\,2.49}$

c. Your friends want to stay and play 49 times, assume this is a reasonably large number of times. Which game offers you a better chance of winning money? Please show your work for full credit. (6 points)

The game with the better chance is: (circle one) GAME A GAME B

Game A

EV = $49(-1.35) = \$\,{}^{-}66.15$

SE = $\sqrt{49} \times 9.06 = 63.42$

$\frac{0 - {}^{-}66.15}{63.42} = 1.04$

-66.15 0

$\frac{100 - 70.63}{2} = \boxed{14.69\%}$

Game B

EV = $49 \times (-0.25) = \$\,-12.25$

SE = $\sqrt{49} \times 2.49 = 17.43$

-12.25 0

$\frac{0 - {}^{-}12.25}{17.43} =$

0.703

$\frac{100 - 51.61}{2} =$

$\boxed{24.20\%}$

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Please indicate whether each statement is true or false (3 points each)

	True	False	Statement
3A	X		The probability histogram for samples follows the normal curve more closely as the sample size increases
3B	X		The more the histogram of a population differs from normal, the larger the sample is needed before the probability histogram appears normal
3C		X	The variability of a probability histogram is the standard deviation of the population
3D	X		The Central Limit Theorem requires that sampling ~~be done with replacement for the~~ probability histogram to follow the normal curve
3E		X	The Central Limit Theorem applies to products and percentages, but not to sums

4. The Dull Computer Company manufacturers its own computers and delivers them directly to customers who order them via the Internet. Dull's market dominance has arisen from its quick delivery and competitive pricing. The CEO (Chief Executive Officer) of Dull has stated publicly that if customers make unassisted online purchases of their computers, the computers will have an average delivery time of 57 hours from the time of purchase (with a standard deviation of 11 hours). He also noted that they will have an average cost of $1,500 with a standard deviation of $400 and 15% of their computers cost less than $1100. Please assume that the cost of the computers are normally distributed

A consumer research organization decided to test the CEO's delivery time claim by purchasing 100 computers from Dull at randomly selected times and days. The 100 purchases were randomly divided into two groups: 51 were purchased by telephone and involved talking to a live salesperson, the remaining 49 were unassisted online purchases. 11 of the 49 computers were delivered in less than 45 hours. Please assume that the purchases (i.e. 100, 51, 49) constitute reasonably large samples.

(a) Please construct a 80% confidence interval for the population percentage of computers that will be delivered in less than 45 hours. (6 points)

$\frac{11}{49} = 0.224$

$SE = \frac{\sqrt{49} \times \sqrt{.224 \times .776}}{49} \times 100 = 5.96\%$

$5.96 \times 1.30 = 7.748\%$

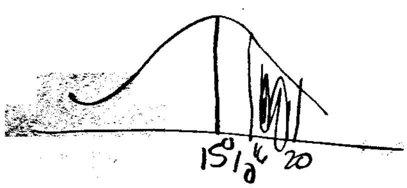
$\boxed{22.4\% \pm 7.748\%}$

+6

(b) What is the probability that a sample of size 49 will have between 16% and 20% of its computers costing less than $1100? (7 points)

$EV = 15\%$

$SE = \frac{\sqrt{49} \times \sqrt{.15 \times .85}}{49} \times 100 = 5.10\%$



$\frac{16-15}{5.10} = .196 \rightarrow 15.85$

$\frac{20-15}{5.10} = .98 \rightarrow 68.27$

$\frac{68.27 - 15.85}{2} = \boxed{26.21\%}$

+7

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