FORM A FORM A FORM A

1. 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 55 hours from the time of purchase (with a standard deviation of 17 hours). He also noted that they will have an average cost of $2,000 with a standard deviation of $600 and 25% of their computers cost less than $1600. 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 200 computers from Dull at randomly selected times and days. The 200 purchases were randomly divided into two groups: 119 were purchased by telephone and involved talking to a live salesperson, the remaining 81 were unassisted online purchases. 22 of the 81 computers were delivered in less than 45 hours. Please assume that the purchases (i.e. 200, 81, 119) constitute reasonably large samples.

(a) Please construct a 90% confidence interval for the population percentage of computers that will be delivered in less than 45 hours. (6 points)

$22/81 \times 100 = 27.1605\%$

$\boxed{1}$ $\boxed{0}$
.2716 .7284

$EV = 27.1605\%$

$SE_{\%} = [(\sqrt{81} \times \sqrt{.2716 \times .7284})/81] \times 100$

$= (9 \times .4448/81) \times 100$

$= 4.9422\%$

$= (4.9422 \times \underset{90\%}{1.65}) = 8.1546$

$27.1605\% \pm 8.1546\%$

(b) What is the probability that a sample of size 81 will have between 20% and 24% of its computers costing less than $1600? (7 points)

<1600

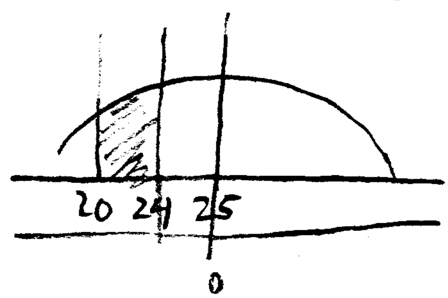
$\boxed{1}$ $\boxed{0}$ 81
.25 .75

$EV = 25\%$

$SE_{\%} = [(\sqrt{81} \times \sqrt{.25 \times .75})/81] \times 100$

$[9 \times .43301/81] \times 100$

4.8113%



$z_{24} = \frac{24-25}{4.8113} = -.207$ (-.20) $\rightarrow 15.85/2 = 7.925$

$z_{20} = \frac{20-25}{4.8113} = -1.039$ (-1.05) $\rightarrow 70.63/2 = 35.315$

$35.315 - 7.925 = 27.39\%$

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

	True	False	Statement
2A		✓	The Central Limit Theorem does not require that sampling be done with replacement for the probability histogram to follow the normal curve
2B		✓	The Central Limit Theorem applies to sums and percentages, but not to averages (means)
2C	✓		The probability histogram for samples follows the normal curve more closely as the sample size increases
2D	✓		The more the histogram of a population differs from normal, the larger the sample is needed before the probability histogram appears normal
2E	✓		The variability of a probability histogram is called the standard error

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FORM X FORM X FORM X

3. The most recent enrollment statistics for the Los Angeles Unified School District revealed that 68% were identified as "Hispanic", 12% as "Non-Hispanic White", 11% as "Black" or "African American and the remainder as "All Others". A recent survey of excellent quality conducted by UCLA on 525 students in the Los Angeles Unified School Districted revealed that 8% were "Asian"

a. If the sample size were 225 instead of 525 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

b. 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)

90% = Z ± 1.65

8% ± 1.65

c. (continuing part c) Suppose it is possible to calculate a confidence interval. If the level of confidence were changed to 99% instead of 90% it would (circle one to fill in the blank) the width of any confidence interval from the sample information (4 points)

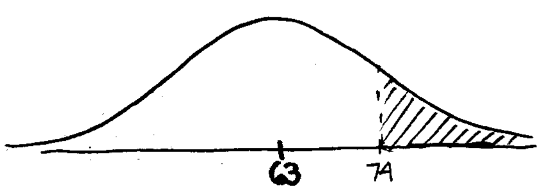
Increase Decrease Not Affect

d. What percentage of samples of size 525 will have more than 74 "Non-Hispanic White" students? (5 points)

NON-HISPANIC WHITS = 12% 525(.12) = 63

SD = $\sqrt{.12 \times .88}$ = .325

SE = $\sqrt{525} \times .325$ = 7.45



$Z = \frac{74-63}{7.45} = 1.48 \Rightarrow 86.64$

$\frac{100-86.64}{2} = 6.68\%$

e. What is the chance that between 7% and 12% of students in a sample of 525 will be identified as "All Others"? (10 points)

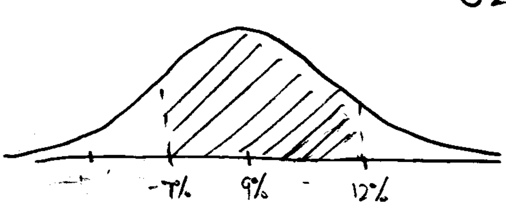
ALL OTHSRS = 100 − (12 + 68 + 11) = 9%

SD = $\sqrt{.09 \times .91}$ = .286

%SE = $\frac{\sqrt{525} \times .286}{525} \times 100 = 1.25$

$Z = \frac{7-9}{1.25} = -1.6 \Rightarrow 89.04$

$Z = \frac{12-9}{1.25} = +2.4 \Rightarrow 98.36$



$\frac{98.36}{2} = 49.18$

$\frac{89.04}{2} = 44.52$

49.18 + 44.52 = 93.7%

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FORM A FORM A FORM A

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

GAME A works like this: you can bet \$3 on a number, and if your number comes up, you win \$5, if not, you lose your \$3. Your number comes up 35% of the time.

GAME B works like this: you can bet \$1 on a number, and if your number comes up, you win \$1, if not, you lose your \$1. Your number comes up 45% 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

your # | other #s
$\boxed{+5}$ | $\boxed{-3}$
.35 | .65

GAME B

Your # | other #s
$\boxed{+1}$ | $\boxed{-1}$
.45 | .55

+8

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 $= (.35)(5) + (.65)(-3)$
$= -0.2$

$SD = (5 - -3) \cdot \sqrt{(.35)(.65)}$
$= 3.816$

GAME B:

box average $= (.45)(1) + (.55)(-1)$
$= -0.1$

$SD = (1 - -1) \cdot \sqrt{(.45)(.55)}$
$= 0.995$

+6

c. Your friends want to stay and play 81 times, assume this is a reasonable number of times. Which game offers you a better chance of winning money? Please show your work for full credit. (6 points)

both games you expect to loose money

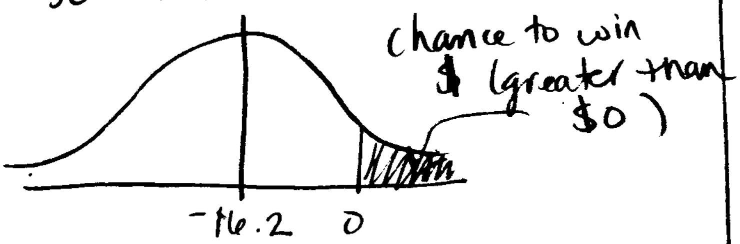
good!

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

GAME A:

$EV = 81 \cdot -0.2 = -16.2$

$SE = \sqrt{81} \cdot 3.816 = 34.344$



$z = \frac{0 - -16.2}{34.344} = 0.472$

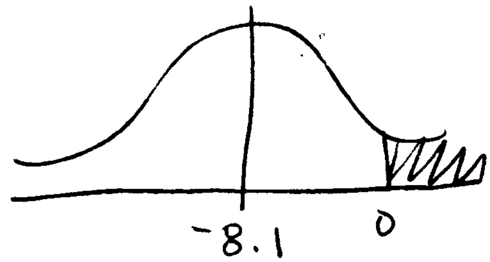
z-score ~ 0.45
area = 34.73%

$\frac{100 - 34.73\%}{2} = \boxed{32.635\% \text{ chance}}$

GAME B

$EV = 81 \cdot -0.1 = -8.1$

$SE = \sqrt{81} \cdot 0.995 = 8.955$



$z = \frac{0 - -8.1}{8.955} = 0.904$

area: 63.19%

$\frac{100 - 63.19\%}{2} = \boxed{18.405\% \text{ chance}}$

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