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

GAME A works like this: you can bet \$2 on a number, and if your number comes up, you win \$6, if not, you lose your \$2. Your number comes up 15% of the time.

GAME B works like this: you can bet \$5 on a number, and if your number comes up, you win \$6, if not, you lose your \$5. Your number comes up 35% 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

+6	-2
.15	.85

Game B:

+6	-5
.35	.65

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 avg: $(.15)(6)+(.85)(-2)=-.8$

SD: $\sqrt{(.15)(6--.8)^2+(.85)(-2--.8)^2}=2.86$

Game B:

Box avg: $(.35)(6)+(.65)(-5)=-1.15$

SD: $\sqrt{\underbrace{.35(6--1.15)^2}_{17.893}+\underbrace{(.65)(-5--1.15)^2}_{9.634}}=5.24$

6

c. Your friends want to stay and play 36 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)

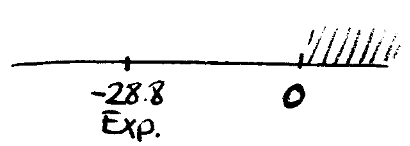
The game with the better chance is: (circle one) GAME A GAME B

6

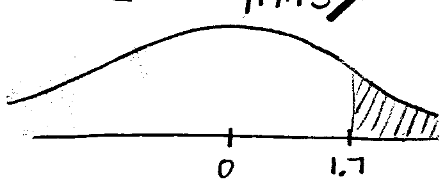
Game A:

EV: $(-.8)(36)=-\$28.80$

SE $=\sqrt{36}\times 2.86\approx 17.13$



$z=28.8/17.13=1.681\approx 1.7$

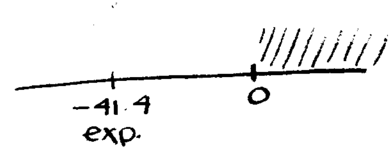


$\frac{100-91.09}{2}=4.46\%$ chance of winning

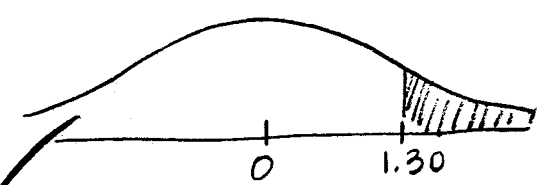
Game B:

EV $=(-1.15)(36)=-\$-41.40$

SE $=\sqrt{36}\times 5.24=31.44$



$z=41.4/31.44=1.317\approx 1.30$



$\frac{100-80.64}{2}=9.68\%$ chance of winning

/20

FORM C FORM C FORM C

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

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

3. 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 56 hours from the time of purchase (with a standard deviation of 18 hours). He also noted that they will have an average cost of $1,800 with a standard deviation of $600 and about 20% of their computers cost less than $1300. 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: 36 were purchased by telephone and involved talking to a live salesperson, the remaining 64 were unassisted online purchases. 16 of the 64 computers were delivered in less than 45 hours. Please assume that the purchases (i.e. 100, 36, 64) constitute reasonably large samples.

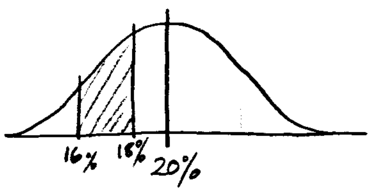
(a) What is the probability that a sample of size 64 will have between 16% and 18% of its computers costing less than $1300? (7 points)

< $1300 ?

1	0
.2	.8

$EV_{\%} = 20\%$

$SE_{\%} = \frac{\sqrt{64} \times \sqrt{.2 \times .8}}{64} \times 100 = 5\%$



$Z_{16\%} = \frac{16 - 20}{5} = -0.8 \rightarrow$ Table A105 => 57.63%

$Z_{18\%} = \frac{18 - 20}{5} = -0.4 \rightarrow$ Table A105 -> 31.08%

$\frac{57.63 - 31.08}{2} = \boxed{13.275\% \text{ chance}}$

7

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

$16/64 = 25\%$ of sample = < 45 hrs

1	0
.25	.75

$SE_{\%} = \frac{\sqrt{64} \times \sqrt{.25 \times .75}}{64} \times 100 = 5.41\%$

80% CI ≈ 1.3 SE

$25\% \pm 1.3(5.41)$

$= \boxed{25\% \pm 7.03\%} = \boxed{(17.97\%, 32.03\%)}$

28

FORM C FORM C FORM C

4. The most recent enrollment statistics for the Los Angeles Unified School District revealed that 72% were identified as "Hispanic", 11% as "Black" or "African American, 9% as "Non-Hispanic White", and the remainder as "All Others". A recent survey of excellent quality conducted by UCLA on 400 students in the Los Angeles Unified School Districted revealed that 7% were "Asian"

1.3

a. Can you construct a 80% 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)

Asian other

1	0
.07	.93

$\sqrt{.07 \times .93} \cdot \sqrt{400} = 5.1029$ SE sum

$\frac{5.1029}{400} \times 100 = 1.2757 \rightarrow 1.2757 \times 1.3$

$72\% \pm 1.6585\%$

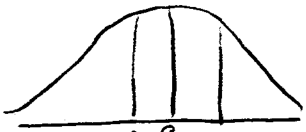
4

b. (continuing part a) Suppose it is possible to calculate a confidence interval. If the level of confidence were changed to 90% instead of 80% 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

4

c. What is the chance that between 7% and 10% of students in a sample of 400 will be identified as "All Others"? (10 points)



other

1	0
.08	.92

SD SE sum SE%

$\sqrt{.08 \times .92} = .2713 \cdot \sqrt{400} = \frac{5.4259}{400} \times 100 = 1.3564$

$\frac{10-8}{1.3564} = 1.47 \rightarrow \frac{85.29}{2} = 42.645$

$\frac{7-8}{1.3564} = -.737 \rightarrow \frac{54.67}{2} = 27.335$

$42.645 + 27.33$

69.98%

10

d. If the sample size were 250 instead of 400 it would (circle one to fill in the blank) the standard error for the sample count of "All Others" students (4 points)

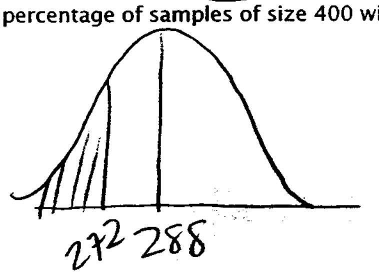
Increase Decrease Not be enough information to calculate

4

e. What percentage of samples of size 400 will have fewer than 272 "Hispanic" students? (5 points)

$\frac{72}{100} = \frac{x}{400}$

$x = 288$



$\frac{272-288}{8.97998} = -1.7817 \rightarrow 92.81$

$\frac{100-92.81}{2} = 3.595\%$

SE =

1	0
.72	.28

$\sqrt{.72 \times .28} = .44899 \times \sqrt{400} = 8.9799$

2