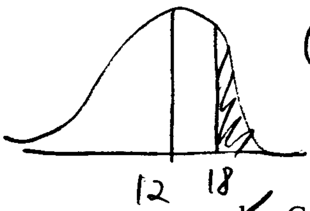
1. The most recent census of Los Angeles, California revealed that 64% of the residents in the city identified their race/ethnic background as "Hispanic", 17% identified their race/ethnic background as "Non-Hispanic White", 11% as "Asian", 6% as "Black" or "African American and 2% as "Other". Next month, a research group at the UCLA Medical School plans to take a simple random sample of 200 residents in Los Angeles

1	0
.06	.94

200

a. What is the chance that in a sample of 200 residents, 18 or more will identify themselves as "Black" or "African American"? If this is calculable, please show how to calculate the chance below, if it is not, please write "not calculable" and justify your response (5 points).

$$Z = \frac{(18-12)}{(\sqrt{200} \times \sqrt{.06 \times .94})} = \frac{6}{3.3586} \approx 1.7865 \quad 92.81$$



Yes, you can since you can make a box + the sample is of reasonable size, and it is a simple random sample

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

b. Can you calculate the standard error for the total number of residents in the sample identifying themselves as "Non-Hispanic White"? If it is possible please write "possible" below and justify your response. If it is not possible, please write "not possible below" and justify your response. (3 points)

1	0
.17	.83

$SE_{SUM} =$

POSSIBLE, because there is enough info to make a box and the sample is of reasonable size (>100), and it is a simple random samble

c. If the UCLA Medical School increases the sample size to 600, the expected percentage of residents in the sample identifying themselves as "Other" is expected to: (3 points)

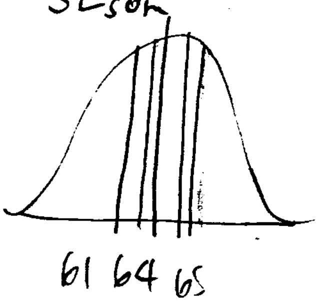
(a) Increase
(b) Decrease
(c) Stay the same
(d) Double
(e) Triple

d. What is the chance that between 61% and 65% of residents the UCLA Medical School sample will identify themselves as "Hispanic"? (9 points)

1	0
.64	.36

~~2~~200 sample

SE_{sum}



$$Z_{\%} = \frac{65-64}{\left(\frac{\sqrt{200} \times \sqrt{.64 \times .36}}{200} \times 100\right)} = \frac{1}{3.39} \approx .2946$$

$$= 23.58\%$$

$$= \frac{61-64}{3.39} = -.885 \approx 63.19\%$$

$$\frac{23.58}{2} + \frac{63.19}{2} = 11.79 + 31.595 \approx 43.385\%$$

2. Does it pay to sue for damages for work related injuries? Suppose this is what is known about people who have taken their employers to court: 10% have won \$200,000, 40% have won \$30,000 and the rest have won nothing. And suppose it costs \$30,000 in legal fees to take a case to court regardless of whether a person wins or loses.

a. The net award (money won minus legal fees) for work related damages can be represented by a box model. Please construct a reasonable model in the space below. (6 points)

170	0	-30
.1	.4	.5

in thousands

Box Average =

$17 + 0 + (-15) = \underline{2,00}$

b. Suppose a large employer gets sued for work related injuries 169 times per year. The 169 lawsuits can be treated like a random sample of size 169. Find the expected value of the total net award. (4 points)

$EV_{SUM} =$ # draws × box average

$169 \times 2,000 = \boxed{\$338,000}$

c. Find the standard error of the net award for the 169 lawsuits. (4 points) thousands

$SD_{box} = \sqrt{.1(170-2)^2 + .4(0-2)^2 + .5(-30-2)^2}$

$\sqrt{2822.4 + 1.6 + 512}$

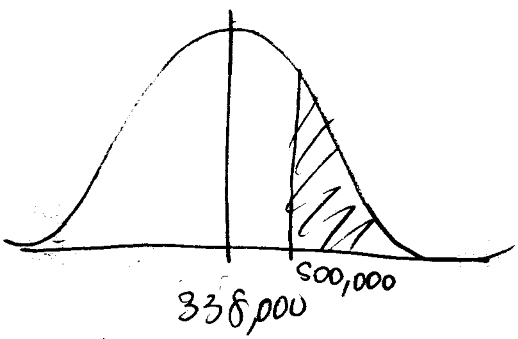
$\sqrt{3336} \approx 57.758$ or $57,758 = SD$

$SE = \sqrt{169} \times 57,758 = \boxed{750,854}$

d. Suppose a large employer knows it will get sued 169 times and has set aside \$500,000 to pay potential awards. Calculate the chance that the employer has not set aside enough money to pay for the awards. (6 points)

$Z_{sum} = \dfrac{\text{obs value} - \text{expected value}}{SE_{sum}}$

$Z_{sum} = \dfrac{500000 - 338,000}{750,854} = .21575$



15.85%

$\dfrac{100 - 15.85}{2} = 42.075\%$

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

	True	False	Statement
3A		✓	The Central Limit Theorem only applies when the number of draws (sample size) is reasonably large and the population is normal.
3B	✓		The purpose of the standard error is to estimate the variability of a probability histogram.
3C	✓		For a population that is not normally distributed, the distribution of sample percentages will be normal as long as the sample is reasonably large.
3D	✓		The Expected Value is the mean of a normally distributed probability histogram
3E			The Central Limit Theorem implies that as the number of draws (sample size) increases, the probability histogram for a sum becomes more and more normal in its appearance

4 2 3

.568 .375 .062

4. In 2001, a survey organization takes a simple random sample of 400 adults in Los Angeles, California, a large American city. Among this sample of adults, it was found that 225 support the death penalty, 150 support life imprisonment with no parole and the rest did not believe in penalties for homicide. It was noted that support for the death penalty had changed from a survey taken in 1991 when approximately 75% of adults in Los Angeles supported the death penalty.

PARAMETER

a. Is it possible to construct a 95% confidence interval for the population percentage of Los Angeles adults who support the death penalty in 2001. (circle one) (7 points)

YES NO

If you circled YES, please construct a 95% confidence interval in the space below. If you circled NO, please use the space to explain why it is not possible to construct a 95% confidence interval.

POP. 75% support death penality

1	0
.5625	.4375

sample box

$\sqrt{400} \times \sqrt{.5625 \times .4375} = SE$

$9.8647 = SE$

$\frac{9.8647}{400} \times 100 = 2.4662\% \times 2$

$\approx 4.9324\%$

$\boxed{56.25\% \pm 4.9324\%}$ for 2001

b. If the level of confidence were 90% instead of 95% 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

c. If the sample size were 1600 instead of 400 it would (circle one to fill in the blank) the width of any confidence interval constructed from the sample information (4 points)

Increase Decrease Not Affect

d. Suppose it was known that actually 60% of all adults in Los Angeles support the death penalty. So if a simple random sample of 625 adults were to be taken, the SE for the sample percentage of death penalty supporters is calculated to be about 2%. You should assume these numbers are correct.

A student, looking at the numbers in part d, interprets them as follows: this means that there is about a 95% chance for the percentage of death penalty supporters in the sample to be in the range 60% ± 4%. (circle one)

The student is correct The student is not correct

Please explain your choice below: (5 points)

The student is correct because 95% chance refers to the percentage of intervals over a long run that contain the parameter.

She is not making claims that the parameter is a variable. exactly.