1.   A survey research organization asked 1,444 U.S. adults (selected using a random probability method) what they considered to be the most serious problem facing America today. 33% said domestic terrorism. Let P denote the percentage of all U.S. adults who think that domestic terrorism is the nation's most serious problem. What is the appropriate standard error for the sample percentage as an estimate of P? (5 points)

$$\frac{\sqrt{1444} \times \sqrt{.33 \times .67}}{1444} \times 100 = 1.24\%$$

2.   Using the information from the previous question, please construct an approximate 99% confidence interval for the percentage of all U.S. adults who think that domestic terrorism is the nation's most serious problem. If this cannot be calculated, please write "not possible" below. (5 points)

$$33\% \pm (3 \times 1.24\%) = 29.28\% \text{ to } 36.72\%$$

3. Your family wants to know what you have learned in Statistics 10 (other than Professor Lew is tough) this quarter. In fact, your family would like you to explain the meaning of the confidence interval you constructed in the previous question in plain English (since they have not taken Statistics 10) please write a brief explanation for them in the space below (5 points).

If we could repeat this sampling procedure 100 times and calculate an interval like each time.
Then 99 out of 100 of those intervals would contain the true parameter P. One of them would not.
Our hope is that this one of the 99 "good" intervals.

4. A.C. Nielsen Inc, is an American television rating service. Advertisers wish to know what ~~percentage~~ of American households will be watching the NCAA Men's Final Basketball game in March. Fifteen hundred American households were selected at random and then surveyed. Analysis revealed that 100 households planned to watch the final game on TV. Identify the population, population parameter, the sample statistic and the standard error for the percentage of households watching the game. Assume that all fifteen hundred households surveyed own a TV set. (10 points)

Ch. 19

The population is ___all Amencain households___

The population parameter is ___the % who will be watchng the game___

The sample is ___1,500 Amencain Households___

The sample statistic is ___$\frac{100}{1500} \times 100 = 6.67\%$___

(we are looking for an exact number in the blank, no need to show work)

The standard error is: ___$\frac{\sqrt{1500} \times \sqrt{.0667 \times .9333}}{1500} \times 100 = .64\%$___

(we are looking for an exact number in the blank, no need to show work)

5. Suppose we really knew that 20% of **all** Americans claim they have seen a live alien from outer space. What is the chance that a simple random sample of 49 Americans will have between 16% and 22% claiming they have seen a live alien from outer space? (10 points)

Ch. 20

if we **knew** then 20% = parameter so
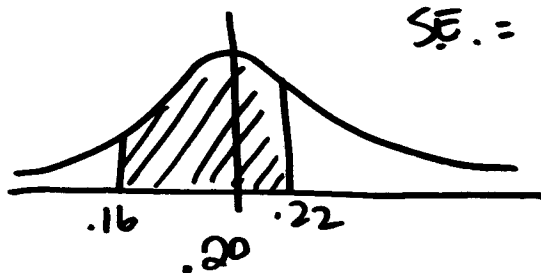
$$SE. = \frac{\sqrt{49} \cdot \sqrt{.20 \times .80}}{49} \times 100 = 5.71\%$$

.16 .22
.20

$$z_{.22} = \frac{.22 - .20}{.0571} = .35 \quad (area = 27.37\%)$$

$$z_{.16} = \frac{.16 - .20}{.0571} = -.70 \quad (area = 51.61\%)$$

$$\frac{27.37}{2} + \frac{51.61}{2} = \boxed{39.49\%}$$

6.   Internet surveys have become increasingly popular, here is one from CNN's website:
Should the U.S. take military action against Serbia?

Opinion	Percentage	Number of votes
Yes	74%	21,288 votes
No	26%	7,618 votes
	Total	28,906 votes

A recent random-digit-dialing telephone poll of 1,500 U.S. households conducted by a national
newspaper showed that less than 50% of the surveyed households answered "Yes" to same question
"Should the U.S. take military action against Serbia?"

Which survey do you think better represents the actual opinion of the population of all U.S. households
on taking military action against Serbia and please explain why. Be brief. If you decide to use words like
"bias", please make it clear that you know what the word means by the use of examples. (5 points)

The ~~~~ telephone poll is better.

1) researcher is selecting the
sample using a random
probability method. Web page
Survey is not – only CNN visitors
see it

2) response-bias problems w/ CNN
poll. Only certain people will
vote.

There are 20,000 restaurants in the County of Los Angeles, 60% of them received a letter grade of "A" during inspections, 30% received either a B or a C grade and 10% failed their inspections. Restaurant grades are not normally distributed.

My financial adviser, the Oracle, has hired you as a temporary personal assistant. Your job is to schedule his next 16 dinners (Oracle never eats at home). Unfortunately, you didn't know about the rating system and you never eat out because you don't have the money. So you listened to your best friend and picked 16 restaurants at random from an internet database of the 20,000 restaurants in Los Angeles.
The Oracle will give you +2 points if you choose "A" restaurants, no points if you choose "B" or "C" restaurants, and -10 points if you choose a restaurant with a failing grade.

7.   What is the expected value for the total score of the 16 restaurants selected at random? (5 points)

Box Average $= +.20$

E.V. $= 16 * .20 = 3.20$

$$\boxed{+2} \quad \boxed{0} \quad \boxed{-10}$$
$$.60 \quad .30 \quad .10$$

8.   What is the standard error for the total score of a sample of 16 restaurants? (10 points)

$$SD = \sqrt{.6(2-.20)^2 + .3(0-.2)^2 + .1(-10-.2)^2} = 3.516$$

$$SE = \sqrt{16} * 3.516 = 14.063$$

9. To convert your temporary job into a permanent job, you must have accumulated a total of at least +19 points from the Oracle after picking 16 restaurants for him. What's your chance of getting a total of at least +19 points after picking 16 restaurants? If it is not possible to calculate the chance, please write "not possible" below. (5 points)
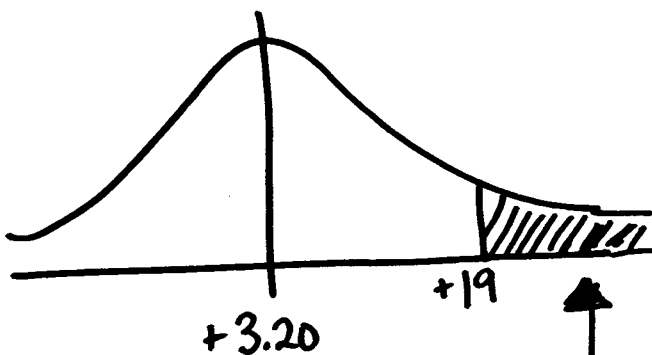
$$z = \frac{19 - 3.20}{14.063} = 1.12$$

about
1.10

area $= 72.87$

so

$$\frac{100 - 72.87}{2} = \boxed{13.565\%}$$

+19

+3.20

1. Should the United Nations continue to have its headquarters in the United States? A television program asked its viewers to call in with their answers for that question. There were 184,900 callers and 67% said "NO".

   A newspaper conducted a survey by interviewing a nationwide random sample of 900 adults and found that 72% answered "YES" to the exact same question (i.e. same wording).

   Which statistic do you believe to be a more reliable estimate of American opinion on this issue and why?

   Newspaper

   1) no selection bias because a random probability method was used

   2) response bias present in the "call-in" survey

A poll reported in Time magazine (February 1995) asked 361 adult Americans the question "Do you think Congress should maintain last year's ban on several types of assault weapons?" 75% responded "yes".

2. What is the standard error for the sample percentage, show your work and calculate a number:

$$\frac{\sqrt{361} \times \sqrt{.75 \times .25}}{361} \times 100 = 2.28\%$$

3. Using the information reported in the Time magazine results above, construct an approximate 95% confidence interval for the population proportion, p. If it is not possible to do this, please write "not possible" on your answer sheet and explain your reasoning here.

$$.75\% \pm 2 \times (2.28) = 75\% \pm 4.56\%$$

$$= 70.44\% \text{ to } 79.56\%$$

M & Ms, a type of candy, are manufactured in the following proportions:

Color	Red	Yellow	Brown	Green	Blue	Orange
Proportion	.2	.2	.3	.1	.1	.1

Suppose we play a game. I have an infinitely large bag of M & Ms and I allow you to close your eyes and reach in and select 100 at random (treat it as if it were a random sample of 100). You win $9 for each blue one you select and you lose $5 for each brown one you select. You neither win nor lose money for picking M & Ms of the other colors. You cannot choose not to play.

4. Calculate the expected value and standard error of the total "winnings" for a sample of 100 M & Ms from this bag.

Box

$$\boxed{+9} \quad \boxed{-5} \quad \boxed{0}$$
$$.1 \quad .3 \quad .6$$

Box Average = $-.6$
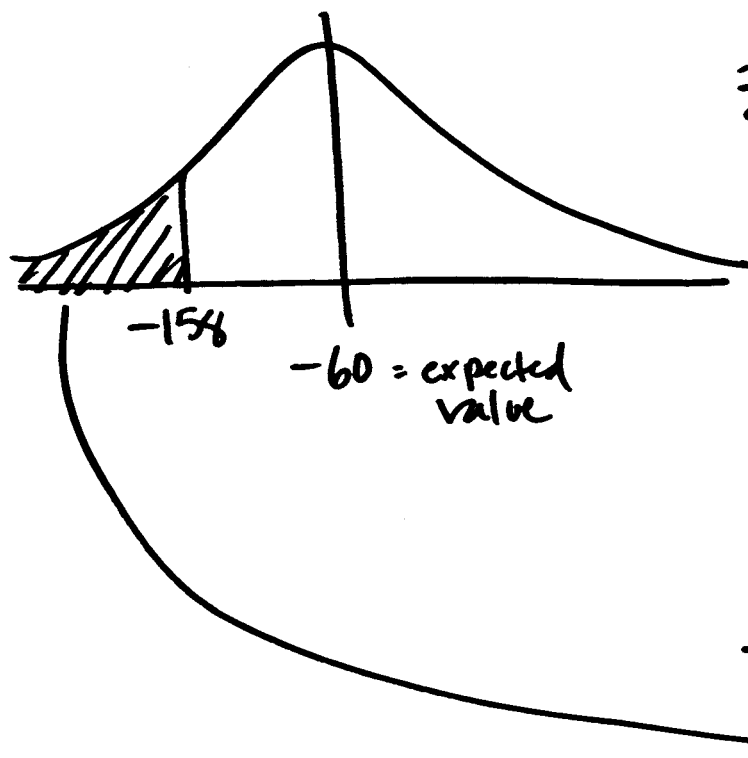
$$E.V. = 100 * -.6 = \pm 60$$

Box SD $= \sqrt{.1(9--.6)^2 + .3(-5--.6)^2 + .6(0--.6)^2}$

$$= 3.904$$

$$SE = \sqrt{100} * 3.904 = 39.04$$

5. You lost $158 to me after picking 100 M&Ms at random from the bag. What was your chance of losing $158 or more to me?

−158

−60 = expected value

$$Z = \frac{-158 - (-60)}{39.04} = -2.51$$

$$\curvearrowright -2.50$$

Area = 98.76
between ± 2.50

so

$$\frac{100 - 98.76}{2} = \boxed{.62\%}$$

6. Suppose it is known that 10% of all Americans believe that the world will end at midnight on January 1, 2000. A magazine would like to know exactly why this 10% believes the world will end, so a nationwide simple random sample of 121 is selected for in-depth interviews. What is the chance that between 5% and 9% of the sample of 121 will believe the world will end?

If 10% ~~believe~~ known that is the parameter = E.V. of %

So $SE_\% = \dfrac{\sqrt{121} \times \sqrt{.10 \times .90}}{121} \times 100 = 2.73\%$

So
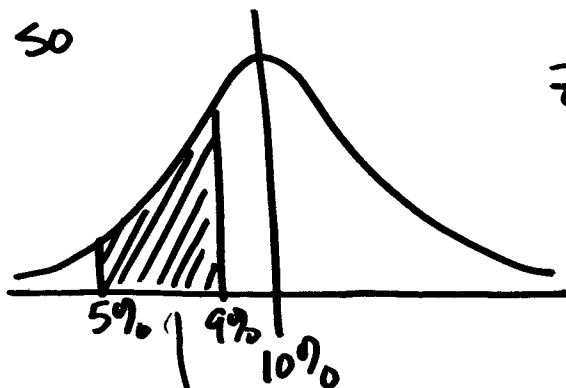
$z_{9\%} = \dfrac{9-10}{2.73} = -.37 \sim -.35$ (area = 27.37)

$z_{5\%} = \dfrac{5-10}{2.73} = -1.83 \sim -1.85$ (area = 93.57)

$\dfrac{93.57 - 27.37}{2} = \boxed{33.10\%}$

7. Suppose from the population of UCLA male undergraduates, a random sample of size 36 is picked and each male's height is measured. Suppose for this random sample, the average height is 69 inches with a standard deviation of 3 inches. What is the 99% confidence interval for the average height of the population?

(a)   67.5 inches to 70.5 inches
(b)   66 inches to 72 inches
(c)   60 inches to 78 inches
(d)   68.5 inches to 69.5 inches
(e)   51 inches to 87 inches

8. The following are the losing scores in ten randomly chosen USC football losses to UCLA (the ten come from all known USC football losses to UCLA):

7, 10, 13, 16, 34, 31, 21, 14, 17, 20

What is the approximate 95% confidence interval estimate of the average USC football loss?

(a)   about 18.3 plus or minus (2*.90)
(b)   about 18.3 plus or minus (2*2.58)
(c)   about 18.3 plus or minus (2*2.72)
(d)   about 18.3 plus or minus (2*8.17)
(e)   about 18.3 plus or minus (2*9.04)