Course: STA 282QR CRN: 22261583

TAKE-HOME ASSIGNMENT (50 Points) Names:_____

Unless otherwise indicated, refer to the class database for all problems. For all hypothesis testing, assume $\alpha = .05$.

Correlation and Regression (20 Points)

Consider the males in our class as a sample of all the males in the U.S.

Use: X = "Height" as the independent variable
Use: Y = "Shoe Size" as the dependent variable

1. Provide a null hypothesis and an alternative hypothesis to test whether a significant correlation is expected between height and shoe size for the population of males in the United States.

Ho: _____

Ha: _____

2. Calculate the test statistic value of r. _____

3. Provide the critical tabulated value of r. _____

4. State your conclusion. _____

5. Whatever your conclusion, proceed to calculate a regression equation of the form $Y = m X + b$.

_____

6. Use the regression equation to predict the shoe size of a male who is 71 inches tall.

_____

14/15

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1st Quiz Names: Katiska D. Hooman

Consider the males in our class as a random sample selected from all the males in the world. Consider their tabulated shoe size values.

1. Complete the frequency distribution below using the data for the sample.

possible x values	Y frequency	cumulative frequency	relative frequency	relative cumulative frequency
10	3	3	3÷6 = 0.5	3÷6 = 0.5
11	2	5	2÷6 = 0.33	5÷6 = 0.83
12	1	6	1÷6 = 0.17	6÷6 = 1.00

2. What is the sample median? 50 percentile 10.5
3. What is the sample mode (or modes)? 10
4. What is the sample mean? Round up 10.67
5. What is the sample range? amount of #'s listed (sub) 12-10=2
6. What is the sample variance? $s^2 = \frac{3.34}{5} = 0.67$ 3.34
7. What is the sample standard deviation? $s = \sqrt{0.67} =$ → 0.819

Now assume this data is not from a sample but from a population.

8. What is the population mean? 10.67
9. What is the population variance? 3.34
10. What is the population standard deviation? 0.746

X	x-mean	(x-mean)^2
10	-0.67	0.4489
10	-0.67	0.4489
10	-0.67	0.4489
11	.33	0.1089
11	.33	0.1089
12	1.33	0.1089
64	0	1.7689

$\sigma^2 = \frac{3.34}{6} = 0.557$

$\sigma = \sqrt{0.557} = 0.746$

13

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2nd Quiz Names: Katicka A. Heard
9/18/14

Assume a person is selected at random from among all the students in our class database.

Let A = the event that the person is a "Male"

Let B = the event that the person prefers "Amazon"

Let C = the event that the person prefers "Target"

1. What is p(A)? 6/26
2. What is p(B)? 5/26
3. What is p(C)? 4/26
4. What is p(A and B)? 3/26
5. What is p(A and C)? 1/26
6. What is p(A or B)? 3/26
7. What is p(A or C)? 1/26 4/26 11/20
8. What is p(A given B)? 3/5
9. What is p(B given A)? 3/4
10. What is p(A given C)? 1/4
11. What is p(C given A)? 1/6

12. Assume we wish to assign 4 specific seats to males in our class. Consider the number of ways we can do this. (What is the number of permutations of the males in our class 4 at a time?)

$_6P_4 = 6 \cdot 5 \cdot 4 \cdot 3 = 360$

360

13. Assume we wish to form a study group of 4 students from the males in our class. Consider the number of ways we can do this. (What is the number of combinations of the males in our class 4 at a time?)

$_6C_4 = \frac{6 \cdot 5 \cdot 4 \cdot 3}{4 \cdot 3 \cdot 2 \cdot 1} = \frac{360}{24} = 15$

15

N is # given
p is # in paragraph
x is # 4 in problem

15

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3rd Quiz Names: Katiska D. Warren

You manufacture parachutes, but your quality control is not very good. The probability is only .9 that one of your parachutes will open safely. You convince each of the male students in our class database to test a parachute. Find probabilities for the following two events:

$n=6$ $p=.9$ $15(.9)^4(.1)^2$

1. Exactly 4 of the parachutes will open. 0.098

${}_6C_4(.9)^4(.1)^{6-4}$ ${}_6C_4 = \frac{6\cdot5\cdot4\cdot3\cdot2}{4\cdot3\cdot2\cdot1} = \frac{30}{2} = 15$

2. At least 4 of the parachutes will open. 0.983

Assume heights for the population of males in the United States follow a normal distribution with the following known parameters:

population mean = 71.2 μ

population standard deviation = 2.5 σ

$Z = \frac{X-M}{\sigma}$

Let x = the height of a male selected at random from all the males in the United States. Use the standard normal distribution in Table E to answer the following:

3. What is p(x < 64.2)? $\frac{64.2\ \ 71.2}{2.5}$ 0.0026

$P(x<64) = P(z<-2.8)$

4. What is p(73.7 < x)? $\frac{73.7-71.2}{2.5}$ $\frac{2.5}{2.5}=1$ $P(1<X)$ .1587

5. What is p(64.2 < x < 73.7)? .8387

(Table Limits to left)

$0.8413 - .0026 =$

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4th Quiz Names: Kathiska D Hearn

Assume the males and females in our class are random samples taken from the population of males and females in the United States. Their heights are used to calculate the following sample statistics:

	Male	Female
Sample Size N	6	20
Sample Mean $\bar{X}$ (xBar)	71.166	63.600
Sample Standard Deviation SS	1.835	4.604
Sample Sum of Squares α	16.833	402.800

Use these sample statistics to answer questions 1 through 5.

1. Calculate a 95% confidence interval for the population mean height of males in the United States, i.e. provide Low and High values so:

$$p(\text{Low} < \mu < \text{High}) = .95$$

Low = 69.240 High = 73.092

2. Provide null and alternate hypotheses to test whether the mean height for the population of males is larger than that for the population of females.

Ho: $\mu_m \leq \mu_f$

Ha: $\mu_m > \mu_f$

$\alpha = .05$ / one tail Test

Assume $\alpha = .05$ for your hypothesis testing.

3. What is the value of your test statistic? 7.566

4. What is the critical value from Student's t distribution? 3.894

5. State your conclusion. Reject null

Whenever it's Relative

÷20 Rel Cml Freq
.10
.30
.60
.80
.95
1.00

1st Homework Assignment STA 282 H Witt

Following are ages of runners in the "Senior" division of a 10K road race:

62	64	61	63	62
60	63	65	61	64
61	62	63	62	60
64	61	62	63	62

Count the Amount of numbers usable ÷20

Freq	Cml Freq.	Relative Freq
2	2	.10
4	6	.20
6	12	.30
4	16	.20
3	19	.15
2	20	.10
1		
20		1.00

X: values

1. Prepare a frequency distribution from the data.

60(2) 61(4), 62(6) 63(4) 64(3) 65(1) =1245/20 62.25

Assume the runners are a sample of all "Senior" runners in the U.S. Calculate the following sample statistics:

ΣX total / n set

2. Mean 62.25
3. Mode =62 is the numbers in sample
4. Median 62 $\frac{62+62}{2}=62$
5. Range 5 start to finish in set 65-60=5
6. Variance
7. Standard Deviation

Consider the runners as a population of all the "Senior" runners in one particular race. Calculate the following population parameters:

8. Mean 62.25
9. Mode 62
10. Median 62
11. Range 5 =65-60=5 amount of #'s
12. Variance
13. Standard Deviation

write all #'s out & add the numbers Divide by total (set)

60, 60, 61, 61, 61, 61, 62, 62, 62, 62, 62, 62, 63, 63, 63, 63, 64, 64, 64, 65

Week 2, 2

3rd Homework Assignment STA 282 H Witt

The local dollar store sells scientific calculators for a buck, but 30% of the calculators are defective; therefore p = .3. Five of the calculators are purchased; therefore n = 5. Find probabilities for the following events:

$p=.3, n=5, x=3 \quad {}_5C_3 (.3)^3(.7)^2$

1. Exactly 3 of the calculators are defective.
2. Fewer than 2 of the calculators are defective. $P(X<2) = .168 + P(X=1) = .360 = .528$
3. At least 4 of the calculators are defective. $P(Y=4) = .028 + P(X=5) = .002 = .030$
4. At most 3 of the calculators are defective.

$P(X=0) = .168 \quad P(X=1) = .360 \quad P(X=2) = .309 \quad P(X=3) = .132 = .969$

Use the standard normal probability distribution to determine the following probabilities:

Area left (chart)

5. p(z < .8) = 0.7881
6. p(.8 < z) = 0.2119
7. p(z < -1.3) = 0.0968
8. p(-1.3 < z) = 0.9032
9. p(-1.3 < z < .8) = 0.6913

~ .18

One thousand scientific calculators are now purchased from the dollar store.

Let x = the number of calculators which are defective.

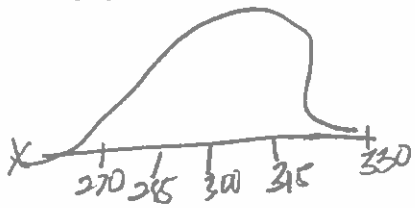
Results from a large number of binomial trials can be approximated using the normal probability distribution. Therefore x is assumed to be normally distributed with the following population parameters.

$z = \frac{x-\mu}{\sigma}$

$\mu = 300$
$\sigma = 15$

$\mu = 300$ $\quad \sigma = 15$

If $x = 279$, $z = \frac{279-300}{15} = \frac{-21}{15} = -1.4$ $\quad P(x<279) =$



Use the normal probability distribution to determine the following probabilities:

If $x = 327$, $z = \frac{327-300}{15} = \frac{27}{15} = 1.8$

10. p(x < 279) .0808
11. p(327 < x) $P(327<x) = P(1.8<z) = .0359$
12. p(279 < x < 327) = $P(-1.4<z<1.8) = .9193$

left limit
- Right limit

< means less than
> means greater than

4th Homework Assignment STA 282 H Witt

A random sample of students is surveyed. Each student is asked to provide his or her shoe size. Results from this study are summarized below:

Chart
t value = 2.365
t = 2.069

	Males	Females
Sample Size	n_M 8	n_F 24
Sample Mean	$\bar{x}_M$ 10.125	$\bar{x}_F$ 8.292
Sample Standard Deviation	s_M 1.356	s_F 1.367
Sample Sum of Squares	SS_M 12.875	SS_F 42.958

1. Calculate a 95% confidence interval for the mean shoe size of the population of all female students. 23

2. Calculate a 95% confidence interval for the mean shoe size of the population of all male students. .95

It is claimed that the mean shoe size of male students is larger than the mean shoe size of female students.

3. Formulate null and alternative hypotheses to test this claim.
$H_0: \mu_{Males} \leq \mu_{Female}$: $H_a: \mu_{Male} > \mu_F$ $\alpha = .05$ (one tail)

4. Calculate a test statistic to test your hypothesis. 3.291

5. Assuming $\alpha = .05$ provide the critical value for this statistic from Student's probability distribution. $T = 1.645$

6. State your conclusion.

Reject H_0 Accept H_a

Standard Normal Probability Distribution

z	Area Left	Area Right	z	Area Left	Area Right
0.0	0.5000	0.5000	0.0	0.5000	0.5000
-0.1	0.4602	0.5398	0.1	0.5398	0.4602
-0.2	0.4207	0.5793	0.2	0.5793	0.4207
-0.3	0.3821	0.6179	0.3	0.6179	0.3821
-0.4	0.3446	0.6554	0.4	0.6554	0.3446
-0.5	0.3085	0.6915	0.5	0.6915	0.3085
-0.6	0.2743	0.7257	0.6	0.7257	0.2743
-0.7	0.2420	0.7580	0.7	0.7580	0.2420
-0.8	0.2119	0.7881	0.8	0.7881	0.2119
-0.9	0.1841	0.8159	0.9	0.8159	0.1841
-1.0	0.1587	0.8413	1.0	0.8413	0.1587
-1.1	0.1357	0.8643	1.1	0.8643	0.1357
-1.2	0.1151	0.8849	1.2	0.8849	0.1151
-1.3	0.0968	0.9032	1.3	0.9032	0.0968
-1.4	0.0808	0.9192	1.4	0.9192	0.0808
-1.5	0.0668	0.9332	1.5	0.9332	0.0668
-1.6	0.0548	0.9452	1.6	0.9452	0.0548
-1.7	0.0446	0.9554	1.7	0.9554	0.0446
-1.8	0.0359	0.9641	1.8	0.9641	0.0359
-1.9	0.0287	0.9713	1.9	0.9713	0.0287
-2.0	0.0228	0.9772	2.0	0.9772	0.0228
-2.1	0.0179	0.9821	2.1	0.9821	0.0179
-2.2	0.0139	0.9861	2.2	0.9861	0.0139
-2.3	0.0107	0.9893	2.3	0.9893	0.0107
-2.4	0.0082	0.9918	2.4	0.9918	0.0082
-2.5	0.0062	0.9938	2.5	0.9938	0.0062
-2.6	0.0047	0.9953	2.6	0.9953	0.0047
-2.7	0.0035	0.9965	2.7	0.9965	0.0035
-2.8	0.0026	0.9974	2.8	0.9974	0.0026
-2.9	0.0019	0.9981	2.9	0.9981	0.0019
-3.0	0.0013	0.9987	3.0	0.9987	0.0013

Survey Data for STA 282QR EPN: 22261583

Simple

Gender	Shoe Size	Height	Shopping
Male	12	73	Amazon
Male	11	69	Amazon
Male	10	69	Amazon
Male	10	73	Target
Male	10	71	TJMaxx
Male	11	72	Walmart
Female	6	61	Amazon
Female	5	48	Amazon
Female	9	64	Costco
Female	8	63	Costco
Female	7	66	Costco
Female	9	60	Macy's
Female	9	69	Target
Female	10	68	Target
Female	10	66	Target
Female	9	66	Target
Female	9	68	Target
Female	8	62	TJMaxx
Female	8	63	TJMaxx
Female	9	64	TJMaxx
Female	8	64	TJMaxx
Female	9	68	Walmart
Female	8	62	Walmart
Female	8	65	Walmart
Female	10	66	Walmart
Female	7	59	Walmart

TOTAL CLASS IS 26

Homework wk #4

Session 4

Critical Values of Student's t Distribution

d.f.	95% Confidence Interval	One Tail alpha=.05	Two Tail alpha=.05
1	12.706	6.314	12.706
2	4.303	2.920	4.303
3	3.182	2.353	3.182
4	2.776	2.132	2.776
5	2.571	2.015	2.571
6	2.447	1.943	2.447
7	2.365	1.895	2.365
8	2.306	1.860	2.306
9	2.262	1.833	2.262
10	2.228	1.812	2.228
11	2.201	1.796	2.201
12	2.179	1.782	2.179
13	2.160	1.771	2.160
14	2.145	1.761	2.145
15	2.131	1.753	2.131
16	2.120	1.746	2.120
17	2.110	1.740	2.110
18	2.101	1.734	2.101
19	2.093	1.729	2.093
20	2.086	1.725	2.086
21	2.080	1.721	2.080
22	2.074	1.717	2.074
23	2.069	1.714	2.069
24	2.064	1.711	2.064
25	2.060	1.708	2.060
26	2.056	1.706	2.056
27	2.052	1.703	2.052
28	2.048	1.701	2.048
:	:	:	:
Infinity	1.960	1.645	1.960

Session 5

Critical Value of r, alpha = .05 (d.f. = n-2)

d.f.	r
1	0.999
2	0.950
3	0.878
4	0.811
5	0.754
6	0.707
7	0.666
8	0.632
9	0.602
10	0.576
11	0.553
12	0.532
13	0.514
14	0.497
15	0.482
16	0.468
17	0.456
18	0.444
19	0.433
20	0.423