Stat 200 Exam 2 March 14, 2018
STATISTICS 200 EXAM 2

PRINT NAME_____ _____ net ID Key
(Last name) (First name) (University email)

Circle Section: **L1** **or** **Online**

Key

READ THIS—We'll deduct a point from your exam if you don't circle your section and write your name and netID clearly.

Write answers in appropriate blanks. When no blanks are provided **CIRCLE** your answers.

******WARNING: When we say "NO WORK, NO CREDIT", we mean it. You'll get a 0.**

Do NOT use scrap paper. If you need some, ask a proctor.

No notes or books are allowed. Calculators (including graphing ones) are allowed.
Do not use your own scrap paper. If you need some, ask a proctor.

Make sure you have all 11 pages (9 problems) including the Z, t, F and Chi-Sq tables.

DO NOT WRITE BELOW THIS LINE_____

The numbers written in each blank below indicate how many points you missed on each page. The numbers printed to the right of each blank indicate how many points each page is worth.

Page 1 _____ 16

Page 2 _____18

Page 3_____ 9

Page 4 _____13

Page 5 _____ 20

Page 6 _____15

Page 7 _____9

Score _____

NO CLASS on Thursday!

Scores will be posted on Compass Thursday night and exams will be returned in class after break.

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Question 1 *(16 pts.)*

We're trying to fit a simple linear regression model for the whole population: $Y=\beta_0 + \beta_1 X + \varepsilon$. (Assume ε are independent and normally distributed with constant variance). We draw a random sample of **n=7** from the population and get a sample correlation **r = 0.6**. Compute the 4 test statistics for testing the **null** $H_0: \beta_1=0$. (same as testing $H_0: r_{population}=0$.)

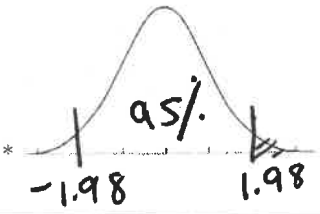
(Round your final answers to 4 decimal places, but don't round during intermediate steps.)

a) *(4 pts.)* Now compute the 4 statistics below. ***Show work below your answers.*** ***NO WORK, NO CREDIT***

	Z	χ^2	t	F
Compute the values of the 4 test statistics. ***Show work below your answers.*** No work, no credit.	Z= 1.98 *(1 pt.)* √ c.e	χ^2 = 3.94 *(1 pt.)* 0.36 / 0.64 × 7	t = 1.68 *(1 pt.)* √ c.e	F= 2.87 *(1 pt.)* 0.36 / 0.64 · 5

b) *(8 pts.)* Compute the **p-value** for each statistic. (No work necessary)

Assume the alternative for the Z and t test is: $H_A: \beta_1 > 0$, and assume the alternative for the χ^2 and F is: $H_A: \beta_1 \neq 0$.

Z	χ^2	t	F
(1 pt.) 2.5%	*(1 pt.)* 5 %	*(1 pt.) Choose one:* i) 1% ii) 2% (ii) 7.7%	*(1 pt.) Choose one:* i) 1% ii) 2% iii) 4% vi) 7.7% (v) 15.4%
(1 pt.) Label Z on the normal curve below and shade the area representing the p-value.  	How many degrees of freedom? 1 *(1 pt.)*	How many degrees of freedom? 5 *(1 pt.)*	How many degrees of freedom in numerator? 1 in denominator? 5 *(1 pt.)*

*If Z is between 2 lines on the Normal Table you may approximate middle area.

c) *(2 pt.)* Suppose our sample y values are: 1, 2, 3, 4, 5, 6, 7. Compute the SST. **Show work. No work, no credit.**

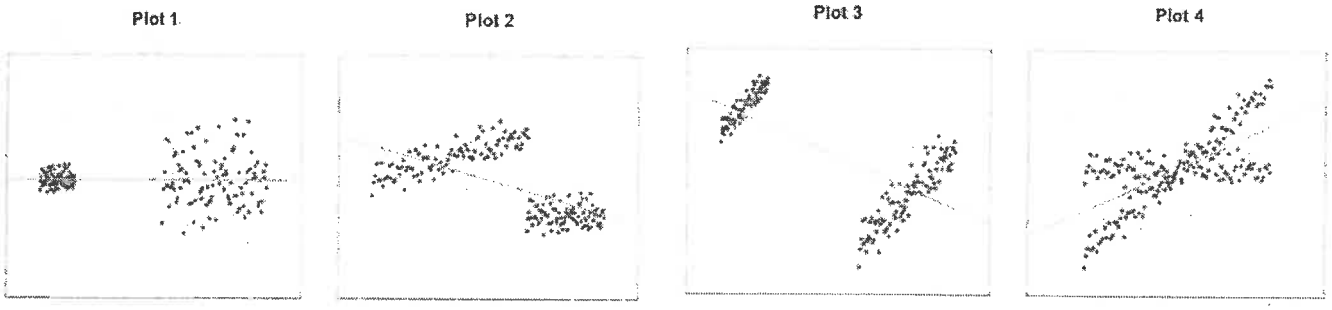
$(-3)^2 + (-2)^2 + (-1)^2 + 0^2 + 1^2 + 2^2 + 3^2 = 28$

d) *(2 pts.)* Compute SSM 10.08 **Show work. No work, no credit.**

$0.36(28) = 10.08$ c.e from

Question 2 *(6 pts.)* Let's say we're trying to figure out if X causes Y and the data consists of 2 prior groups, A and B. For each plot below (displaying two separate groups) indicate whether they display only interaction, only confounding, both or neither. *Fill in the blanks with the correct plot number (1, 2, 3 or 4)*

a) Plot 4 only interaction b) Plot 3 only confounding c)Plot 2 both d) Plot 1 Neither



Question 3 (6 pts.) NO c.e b/c they can check work

Suppose a random sample yields these 3 points: **(1, 12), (3, 10), (8, 44).**

$\bar{y}$ = 22 and SST= 728 .

Compute SSM and SSE. *Show work below each answer.*

i) SSM= 650

Show work. No work, no credit.

$(7-22)^2 + (17-22)^2 + (42-22)^2$

ii) SSE= 78

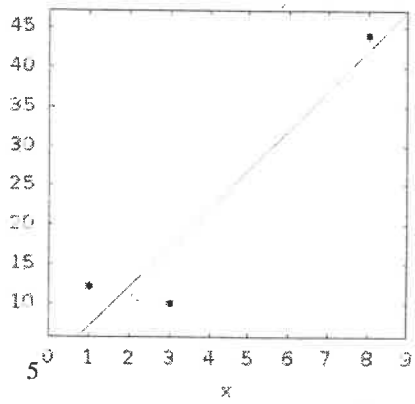
Show work. No work, no credit.

$728 - 650 = 78$

OR $(12-7)^2 + (10-17)^2 + (44-42)^2$

Sample Scatter plot and regression equation:

$\hat{y} = 2 + 5x$



Question 4 *(6 pts.)* Suppose A and B are 2 drugs designed to increase exam scores. The numbers in the table indicate the mean increase in exam scores from those who received A alone, B alone, neither or both. Each table describes a different hypothetical study. **Fill in the 8 blanks in the tables so they match their equations and fill in the 4 blanks in the equation so it matches its table.** *(1/2 pt for each box and blank correctly answered.)* No work necessary.

Exam Increase= 4A + 6B

	A=0	A=1
B=0	0	4
B=1	6	10

Exam Increase= 4A + 6B + 3AB

	A=0	A=1
B=0	0	4
B=1	6	13

Exam Increase = 2 + 3 A 5 B+ 5 AB

	A=0	A=1
B=0	2	5
B=1	7	15

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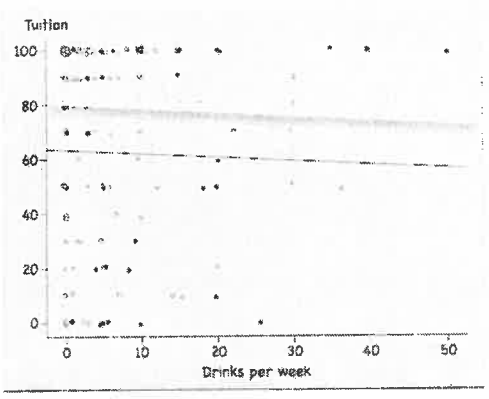
Question 5 *(9 pts.)*
The scatter plots below show the survey responses of the 40 Greeks (fraternity or sorority members) and 200 non-Greeks in Stat 200 to the 2 questions: "How many drinks do you consume per week?" and "What percent of your tuition are your parents paying for?"

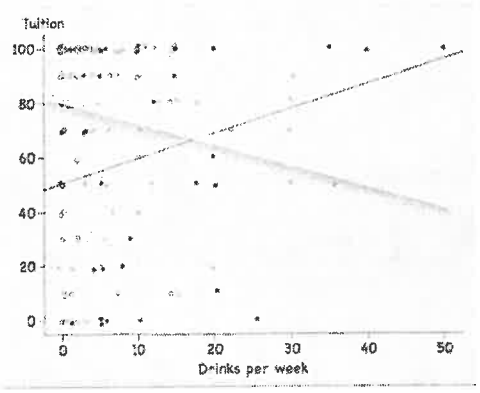
Both scatter plots break the data into Greeks and non-Greeks and fit separate lines for each gender. Plot A forces both groups to have the same slope and Plot B fits the best slope for each group.

Plot A



Non- Greek: Tuition= 81 - 0. 14 (Drinks)
Greek: Tuition = 63 - 0. 14 (Drinks)

Plot B



Non-Greek: Tuition = 83 – 0.76 (Drinks)
Greek: Tuition = 50 + 0.91 (Drinks)

a) *(2 pts.)*Translate the 2 simple regression equations from **Plot A** into the multiple regression equation below.(Fill in the 3 blanks.) Assume Greek is a 0-1 variable coded with **Non-Greek=0 and Greek=1.** *No work necessary.*

½ pt ½ pt 1 pt

Tuition = 81 + −0.14 **(Drinks)** + −18 **(Greek)**

1/2 1/2 1

b) *(2 pts.)*Translate the 2 simple regression equations in **Plot B** into the multiple regression equation below. (Fill in the 4 blanks.) *No work necessary.*

½ pt each

Tuition = 83 + −0.76 **(Drinks)** + −33 **(Greek)** + 1.67 **(Drinks*Greek)**

c) *(2 pts.)* Which plot gives exactly the same regression equations you'd get if you split the data in two and drew separate scatter plots for Greeks and Non-Greek? ***Choose one:*** i) Plot A ii) Plot B

d) *(1 pt.)* How would you interpret the slopes in the 2 regression equations given in Plot B?
(i) On average, for each drink, parents of Greeks pay 0.9% more tuition and parents of non-Greeks pay 0.76% less tuition.
ii) On average, for each percent tuition, Greeks have 0.9 more drinks and non-Greeks have 0.76 less drinks.
iii) The best estimate of the percent tuition for someone who has 0 drinks.
iv) The best estimate of the number of drinks for someone whose parents pay 0% tuition.

e) *(1 pt.)* How would you interpret the y- intercepts in the 2 regression equations given in Plot B?
i) On average, for each drink, parents of Greeks pay 0.9% more tuition and parents of non-Greeks pay 0.76% less tuition.
ii) On average, for each percent tuition, Greeks have 0.9 more drinks and non-Greeks have 0.76 less drinks.
(iii) The best estimate of the percent tuition for someone who has 0 drinks.
iv) The best estimate of the number of drinks for someone whose parents pay 0% tuition.

f) *(1 pt.)* If you switched the code to Greeks=0 and Non-Greeks=1, which of the following would change?
Circle all that would change:
i) Scatter Plots pictured above (ii) Multiple Regression Equations iii) Simple Regression Equations

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Question 6 (13 pts)

In the same survey students also reported their ACT scores. Here's the multiple regression equation predicting the percent tuition parents pay from ACT scores and # of drinks for the **240** students who responded to the survey:

$$\hat{\text{Tuition}} = -1 + 2.7(\text{ACT}) - 0.5(\text{Drinks})$$

a) *(5 pts.)* To test the overall regression effect, H_0:R=0 against H_A:R≠0 fill in the missing blanks in the ANOVA table.

Source	SS (Round to nearest whole number)	df	MS (Round to 2 decimal places)	(Round to 2 decimal places)
Model	SSM= 28,393	(0.5 pt) 2	(0.5 pt) No work, no credit. 28,393/2 = 14,196.5	(0.5 pt) F= No work, no credit. 14,196.5 / 914.79 = 15.52
Error	(0.5 pt) SSE= 216,805	(0.5 pt) 237	(0.5 pt) No work, no credit. 216,805/237 = 914.79	(0.5 pt) SD^+_{errors}= No work, no credit. $\sqrt{914.79} = 30.2$
Total	SST= 245,198	(0.5 pt) 239	Nothing goes in this box.	(1 pt) R^2= No work, no credit. 28,393 / 245,198 = 0.116

0.12 root

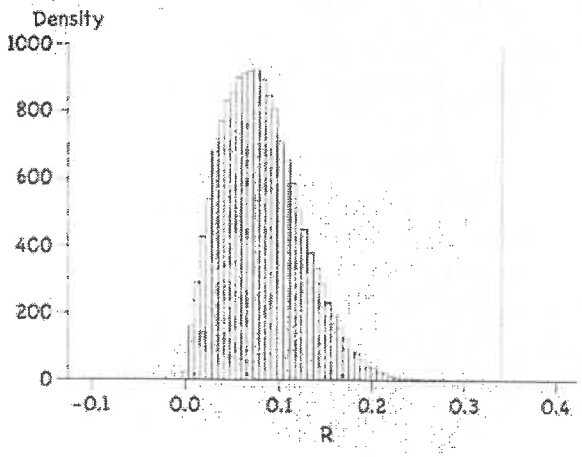
b) *(2 pts.)* When the null is true you'd expect the F stat to be about 1 .

c) *(2 pts.)* Comparing the F-stat you got in (a) to what you'd expect under the null (or by looking on the F-table) you can estimate the p value to be **i)** < 1% **ii)** 1% to 5% **iii)** 5% to 10% **iv)** > 10%

d) *(2 pts.)*Another way to compute the p-value is by the re-randomization test. The histogram on the right shows the randomization test results of 50,000 randomizations showing the distribution of R's.

What does the vertical line mark?

- **i.** the specified significance level α
- **ii.** the randomized R's that land at p-value = 0.5 %
- **iii.** the value of our sample R.



e) *(2 pts.)* The p-value given by the randomization test is closest to ....

- i) 0
- ii) 1%
- iii) 5%
- iv) not enough info

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Question 7 (*20 pts.*)Suppose the Final Exam scores, quiz scores and lab scores of **33** randomly selected students from a large Physics class of 2000 students yielded the following multiple regression equation with **R= 0.5** $\hat{\text{Final}} =$ **50 + 0.3(Quiz) + 0.1(Lab)**

a) *(2 pts.)* The above equation describes the best fitting _____ through all the points so as to minimize the squared errors in the _____.

Circle one for the 1st blank: a) line b) plane c) ellipsoid d) cube

Circle one for the 2nd blank: a) Final Exam Scores b) Quiz scores c) Lab scores

b) *(2 pts.)* The multiple regression equation for all students with Labs = 70 simplifies to $\hat{F} =$ 57 + 0.3 (Quiz)

c) *(2 pt.)* The multiple regression equation predicts Doug to have a Final score of 70. If Alex scored 10 points higher than Doug on the quizzes and 20 points higher on the labs what's Alex's predicted Final score? 75

70 + 0.3(10) + 0.1(20)

d) Do the F test for the overall regression effect for the model: $\hat{\text{Final}} =$ **50 + 0.3(Quiz) + 0.3(Lab)** **R= 0. 5** and **n=33**

$R^2 =$ 0.25 and **1- R^2=** 0.75

F-test (5 pts)

(2 pts.) Compute the F statistic. Show work. No work, no credit.

$\frac{0.25}{0.75} \frac{30}{2} =$ 57

(1 pt.) Look at the F table. What is F*(the critical value of F) at $\alpha = 0.01$? F* = 5.3903

(2 pts.) Our F test stat < F* so our p-value is > than 1%.
Fill in the two blanks with either <, >, or =

Ce from F-stat if

e) *(1 pt.)* Suppose you decided to reject the null at $\alpha = 0.05$, you'd conclude that

F-stat > 5.3903 then > <

i) Both slopes must be significant.
ii) The Quiz slope must be significant.
iii) The Lab slope must be significant.
iv) The intercept must be significant.
v) Either the Quiz or the Lab slope or both must be significant.

f) *(1 pt.)* To see which slope is significant in the multiple regression equation $\hat{\text{Final}} =$ **50 + 0.3(Quiz) + 0.1(Lab)** the computer ran a Z test and a t-test. Which table shows the t-test? ***Circle one:***

i) Table A ii) Table B iii) Not enough information to determine

Table A

	Slope	SE	t or Z	p
Quiz	0.3	0.1	3	0.185%
Lab	0.1	0.08	1.25	10.565%

Table B

	Slope	SE	t or Z	p
Quiz	0.3	0.1049	2.86	0.365%
Lab	0.1	0.0839	1.192	12.09%

g) *(1 pt.)* How many degrees of freedom for the t-test? 30

h) *(2 pts.)* Another variable is added to the model. Will R^2 go up or down?

i) R^2 will go up or stay the same, it can't go down.
ii) R^2 will go down or stay the same, it can't go up.
iii) R^2 could go up, down or stay the same depending on the variable.

i) *(2 pts.)* Let's say a 3rd variable that's correlated with the Final is added to the multiple regression model and the Quiz and Lab slopes stay the same. You can conclude the 3rd variable must be

i) correlated with either Quizzes or Labs.
ii) correlated with both Quizzes and Labs.
iii) uncorrelated with both Quizzes and Labs.
iv) negatively correlated with Quizzes and positively correlated with Labs (or vice versa) so their effects cancel out.

j) *(2 pts.)* How was the multiple correlation, **R= 0. 5** calculated?

i. It's the correlation between the Final scores, quiz scores and lab scores after they've been converted to Z scores.
ii. It's the correlation between students' actual Final scores and their predicted ones from the multiple regression equation.

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Question 8 *(15 pts.)*Last semester **1575** students reported how many sex partners they've had and they identified their ethnicity. Imagine these students were randomly chosen from a much larger population. Here are the results:

Ethnicity	Average number of partners	SD (rounded)	n
White	3.4	6.5	650
Black	2.7	6.5	134
Hispanic	4.0	7.8	207
East Asian	2.03	6.3	410
South Asian	1.1	2.9	100
Other	3.77	8.8	74

$SD^+_{errors} = 6.6$
(Use SD^+_{errors} as a pooled estimate for the SD^+ of each group)

a) (1 pt.) To test the null hypothesis that all 6 group means are the same in the population, compute the χ^2 test statistic.
R= **0. 125** No work, no credit. $\frac{0.125^2}{1-0.125^2} \cdot 1575 = 25$

b) (1 pt.) When the null is true the mean of the χ^2 statistic = ___5___. (Write a number in the blank.)

c) *(1 pt.)* Look at the χ^2 table. What is χ^2 * (the critical value of χ^2) at $\alpha = 0.001$ $\chi^2 * =$ 20.52

d) *(1 pt.)* Our χ^2 test stat ___>___ χ^2*, so our p-value is ___<___ than 0.1%. Fill in the two blanks with either <, >, or =

e) (1 pt.) What do you conclude? ***Choose one.***
- **i)** That all the group averages are significantly different from each other in the population.
- **ii)** That *at least one* of the group averages is significantly different from the others in the population.
- **iii)** That none of the group averages are significantly different from each other in the population.

f) Compute the t-statistic to test whether the difference in group averages between "Other" and "South Asians" is statistically significant.

i) (2 pts.)What is the $SE_{difference}$? Use $SD^+_{errors} = 6.6$ *Round to 3 decimal places.* **No work, no credit.** Circle answer.

$SE_{diff} = 6.6\sqrt{\frac{1}{74}+\frac{1}{100}} = 1.012$

ii) (2 pt.) What is the t-statistic? *Round to 3 decimal places.* **No work, no credit.** Circle answer.

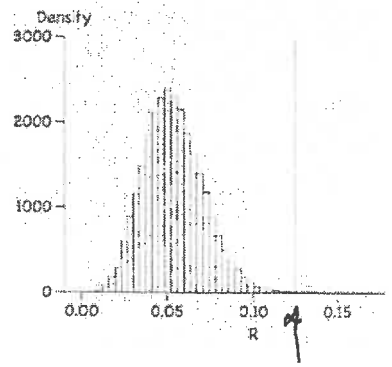
$\frac{3.77-1.1}{1.012} = 2.638$

iv) (2 pts) The p-value is about 0.84%. The Bonferroni correction would change the p-value to 12.6%. 0.84×15

v) (1 pt.) Is the difference between the 2 group averages statistically significant at the 5% level? i) Yes ii) No

g)(1 pt.) The Bonferroni correction lowers the probability of … ***Choose one.***
i) Not detecting a difference that really exists **ii)** Detecting a difference that really doesn't exist **iii)** Both **iv)** Neither

h) Now let's test the same null (H_0: $R_{population} = 0$) against the same alternative (H_A: $R_{population} \neq 0$) using the randomization test. The histogram below shows the distribution of R's resulting from 100,000 randomizations.



i) (1 pt) How was each randomization done?
- **a.** The 1575 *predicted* responses were randomly distributed among the 6 ethnic groups.
- **b.** The 1575 *actual* responses were randomly distributed among the 6 ethnic groups
- **c.** Each actual response was randomly assigned to one of the 6 ethnic groups with equal probability.

ii) (1 pt.) The vertical line falls between 0.1 and 0.15, give its exact location. 0.125

0.125

Question 9 (9 pts.)

9 numbers are divided into 3 groups as shown below.

	Group 1	Group 2	Group 3	
	0	4	5	
	2	6	7	
	4	8	9	
	Mean=2	Mean=6	Mean=7	Overall Mean=5

The SST is given to you in the table below.

a) *(2 pts.)* Calculate SSB. ***No work, no credit.***

$\sum(\hat{y}-\bar{y})^2$ $3(2-5)^2 + 3(6-5)^2 + 3(7-5)^2$

$3.9 + 3.1 + 3.4 = 42$

b) *(2 pts.)* Calculate SSW. ***No work, no credit.***

$\sum(y-\hat{y})^2$ Either $66-42=24$ or

$(0-2)^2 + 0 + (4-2)^2 + (4-6)^2 + 0 + (8-6)^2 + (5-7)^2 + 0 + (7-5)^2$

$4 + 0 + 4 + 4 + 0 + 4 + 4 + 0 + 4 = 24$

c) Fill in the blanks on the table below by writing in your answers for a an b and completing the other 8 boxes. (4 pts, 0.5 for each box)

Source	SS (Sum of Squares)	df	Mean Square	
Model	SSB= 42	2	21	F Stat= 5.25
Error	SSW= 24	6	4	SD^+_{errors}= 2
Total	SST= 66	8	Don't fill in this box.	R^2= 0.64 No work, no credit. $42/66 = 0.64$ (Round to 2 decimal places.)

d) *(1 pt.)* p-value is closest to i) 0.1% ii) 1% iii) 5% iv) 10%

Critical Values for F distribution at p = 5% and p = 1%

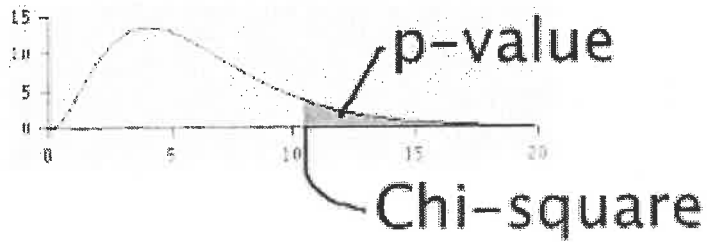
F Distribution critical values for P=0.05

▼ Denominator	Numerator DF													
DF	1	2	3	4	5	7	10	15	20	30	60	120	500	1000
1	161.45	199.50	215.71	224.58	230.16	236.77	241.88	245.95	248.01	250.10	252.20	253.25	254.06	254.19
2	18.513	19.000	19.164	19.247	19.296	19.353	19.396	19.429	19.446	19.462	19.479	19.487	19.494	19.495
3	10.128	9.5522	9.2766	9.1172	9.0135	8.8867	8.7855	8.7028	8.6602	8.6165	8.5720	8.5493	8.5320	8.5292
4	7.7086	6.9443	6.5915	6.3882	6.2560	6.0942	5.9644	5.8579	5.8026	5.7458	5.6877	5.6580	5.6352	5.6317
5	6.6078	5.7862	5.4095	5.1922	5.0504	4.8759	4.7351	4.6187	4.5582	4.4958	4.4314	4.3985	4.3731	4.3691
7	5.5914	4.7375	4.3469	4.1202	3.9715	3.7871	3.6366	3.5108	3.4445	3.3758	3.3043	3.2675	3.2388	3.2344
10	4.9645	4.1028	3.7082	3.4780	3.3259	3.1354	2.9782	2.8450	2.7741	2.6996	2.6210	2.5801	2.5482	2.5430
15	4.5431	3.6823	3.2874	3.0556	2.9013	2.7066	2.5437	2.4035	2.3275	2.2467	2.1601	2.1141	2.0776	2.0718
20	4.3512	3.4928	3.0983	2.8660	2.7109	2.5140	2.3479	2.2032	2.1241	2.0391	1.9463	1.8962	1.8563	1.8498

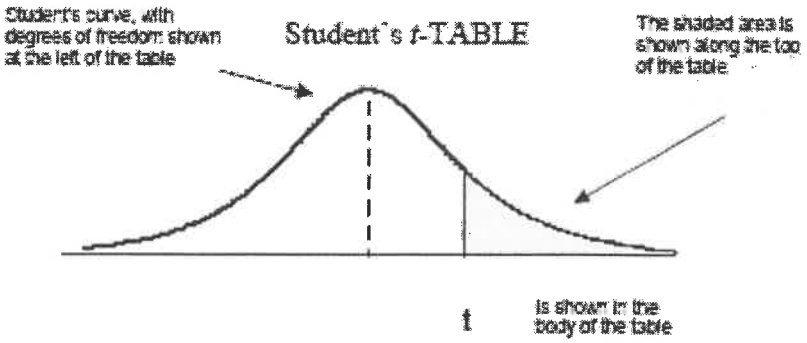
F Distribution critical values for P=0.01

▼ Denominator	Numerator DF													
DF	1	2	3	4	5	7	10	15	20	30	60	120	500	1000
1	4052.2	4999.5	5403.4	5624.6	5763.6	5928.4	6055.8	6157.3	6208.7	6260.6	6313.0	6339.4	6359.5	6362.7
2	98.503	99.000	99.166	99.249	99.299	99.356	99.399	99.433	99.449	99.466	99.482	99.491	99.497	99.498
3	34.116	30.817	29.457	28.710	28.237	27.672	27.229	26.872	26.690	26.504	26.316	26.221	26.148	26.137
4	21.198	18.000	16.694	15.977	15.522	14.976	14.546	14.198	14.020	13.838	13.652	13.558	13.486	13.474
5	16.258	13.274	12.060	11.392	10.967	10.455	10.051	9.7222	9.5526	9.3793	9.2020	9.1118	9.0424	9.0314
7	12.246	9.5467	8.4513	7.8466	7.4605	6.9929	6.6201	6.3143	6.1554	5.9920	5.8236	5.7373	5.6707	5.6601
10	10.044	7.5594	6.5523	5.9944	5.6363	5.2001	4.8492	4.5582	4.4055	4.2469	4.0818	3.9964	3.9303	3.9195
15	8.6831	6.3588	5.4169	4.8932	4.5557	4.1416	3.8049	3.5223	3.3719	3.2141	3.0471	2.9594	2.8906	2.8796
20	8.0960	5.8489	4.9382	4.4306	4.1027	3.6987	3.3682	3.0880	2.9377	2.7785	2.6078	2.5167	2.4446	2.4330
30	7.5624	5.3903	4.5098	4.0179	3.6990	3.3046	2.9791	2.7002	2.5486	2.3859	2.2078	2.1108	2.0321	2.0192
60	7.0771	4.9774	4.1259	3.6491	3.3388	2.9530	2.6318	2.3522	2.1978	2.0284	1.8362	1.7264	1.6328	1.6169
120	6.8509	4.7865	3.9490	3.4795	3.1736	2.7918	2.4720	2.1914	2.0345	1.8600	1.6557	1.5330	1.4215	1.4015
500	6.6858	4.6479	3.8210	3.3569	3.0539	2.6751	2.3564	2.0746	1.9152	1.7353	1.5175	1.3774	1.2317	1.2037
1000	6.6603	4.6264	3.8012	3.3379	3.0356	2.6571	2.3387	2.0564	1.8987	1.7168	1.4953	1.3513	1.1947	1.1586

Chi-square table

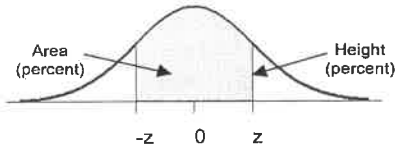


Degrees of freedom ↓	30%	10%	5%	1%	0.1%	← p-value
1	1.07	2.71	3.84	6.63	10.83	
2	2.41	4.61	5.99	9.21	13.82	
3	3.66	6.25	7.81	11.34	16.27	
4	4.88	7.78	9.49	13.28	18.47	
5	6.06	9.24	11.07	15.09	20.52	
6	7.23	10.64	12.59	16.81	22.46	
7	8.38	12.02	14.07	18.48	24.32	
8	9.52	13.36	15.51	20.09	26.12	
9	10.66	14.68	16.92	21.67	27.88	
10	11.78	15.99	18.31	23.21	29.59	
11	12.90	17.28	19.68	24.72	31.26	
12	14.01	18.55	21.03	26.22	32.91	← Chi-square
13	15.12	19.81	22.36	27.69	34.53	
14	16.22	21.06	23.68	29.14	36.12	
15	17.32	22.31	25.00	30.58	37.70	
16	18.42	23.54	26.30	32.00	39.25	
17	19.51	24.77	27.59	33.41	40.79	
18	20.60	25.99	28.87	34.81	42.31	
19	21.69	27.20	30.14	36.19	43.82	
20	22.77	28.41	31.41	37.57	45.31	
21	23.86	29.62	32.67	38.93	46.80	
22	24.94	30.81	33.92	40.29	48.27	
23	26.02	32.01	35.17	41.64	49.73	
24	27.10	33.20	36.42	42.98	51.18	



Degrees of freedom	*25%*	*10%*	*5%*	*2.5%*	*1%*	*0.5%*
1	1.00	3.08	6.31	12.71	31.82	63.66
2	0.82	1.89	2.92	4.30	6.96	9.92
3	0.76	1.64	2.35	3.18	4.54	5.84
4	0.74	1.53	2.13	2.78	3.75	4.60
5	0.73	1.48	2.02	2.57	3.36	4.03
6	0.72	1.44	1.94	2.45	3.14	3.71
7	0.71	1.41	1.89	2.36	3.00	3.50
8	0.71	1.40	1.86	2.31	2.90	3.36
9	0.70	1.38	1.83	2.26	2.82	3.25
10	0.70	1.37	1.81	2.23	2.76	3.17
11	0.70	1.36	1.80	2.20	2.72	3.11
12	0.70	1.36	1.78	2.18	2.68	3.05
13	0.69	1.35	1.77	2.16	2.65	3.01
14	0.69	1.35	1.76	2.14	2.62	2.98
15	0.69	1.34	1.75	2.13	2.60	2.95
16	0.69	1.34	1.75	2.12	2.58	2.92
17	0.69	1.33	1.74	2.11	2.57	2.90
18	0.69	1.33	1.73	2.10	2.55	2.88
19	0.69	1.33	1.73	2.09	2.54	2.86
20	0.69	1.33	1.72	2.09	2.53	2.85
21	0.69	1.32	1.72	2.08	2.52	2.83
22	0.69	1.32	1.72	2.07	2.51	2.82
23	0.69	1.32	1.71	2.07	2.50	2.81
24	0.68	1.32	1.71	2.06	2.49	2.80
25	0.68	1.32	1.71	2.06	2.49	2.79

STANDARD NORMAL TABLE



z	*Area*		*z*	*Area*		*z*	*Area*
0.00	0.00		1.50	86.64		3.00	99.730
0.05	3.99		1.55	87.89		3.05	99.771
0.10	7.97		1.60	89.04		3.10	99.806
0.15	11.92		1.65	90.11		3.15	99.837
0.20	15.85		1.70	91.09		3.20	99.863
0.25	19.74		1.75	91.99		3.25	99.885
0.30	23.58		1.80	92.81		3.30	99.903
0.35	27.37		1.85	93.57		3.35	99.919
0.40	31.08		1.90	94.26		3.40	99.933
0.45	34.73		1.95	94.88		3.45	99.944
0.50	38.29		2.00	95.45		3.50	99.953
0.55	41.77		2.05	95.96		3.55	99.961
0.60	45.15		2.10	96.43		3.60	99.968
0.65	48.43		2.15	96.84		3.65	99.974
0.70	51.61		2.20	97.22		3.70	99.978
0.75	54.67		2.25	97.56		3.75	99.982
0.80	57.63		2.30	97.86		3.80	99.986
0.85	60.47		2.35	98.12		3.85	99.988
0.90	63.19		2.40	98.36		3.90	99.990
0.95	65.79		2.45	98.57		3.95	99.992
1.00	68.27		2.50	98.76		4.00	99.9937
1.05	70.63		2.55	98.92		4.05	99.9949
1.10	72.87		2.60	99.07		4.10	99.9959
1.15	74.99		2.65	99.20		4.15	99.9967
1.20	76.99		2.70	99.31		4.20	99.9973
1.25	78.87		2.75	99.40		4.25	99.9979
1.30	80.64		2.80	99.49		4.30	99.9983
1.35	82.30		2.85	99.56		4.35	99.9986
1.40	83.85		2.90	99.63		4.40	99.9989
1.45	85.29		2.95	99.68		4.45	99.9991