Math 243 – Introduction to Probability and Statistics   Fall 2008

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Text: *The Basic Practice of Statistics* by Moore, Fourth edition
Web page for this course: http://www.whfreeman.com/bps4e
Reference: *Against All Odds: Inside Statistics.* Video Series, Knight Library

Exams: There will be one 70 minute exam given during regular class session, eight quizzes given during discussion sessions (the low score will be thrown out and only the top seven will count toward your grade), and a final exam. See schedule below for exam and quiz dates and times.
The exam dates and times are 'not' negotiable and there will be no make-ups on exams or quizzes. In case of illness, or a conflict with a sanctioned university activity or event, special arrangements will be made.

Grade: Your course grade will be based on a weighted average score of your homework, quizzes, midterms, and final. The relative value of these components is given below. The scale for determining your final grade is as follows: A=(90-100%), B=(80-89%), C=(70-79%), C- =(65-69%), D=(55-64%), F=(0-54%). *There is no extra credit.*

> Homework............10%
> Quizzes................30%
> Midterm...............30%
> Final Exam............30%

Quizzes: During eight of the discussion sessions there will be a quiz. The questions on these quizzes will be variations of the 'recommended' problems on the homework. *There will be no make-up quizzes or quizzes given outside of class sessions.*

Calculator: A graphing calculator is required for this course. We highly recommend the TI-83, TI-83 plus, or TI-84. Many of the assigned exercises will call for the use of such a calculator. You will be expected to know how to use your calculator. *Calculator help will not be given during exams.* Texas Instruments' manual on the Web: TI-83 http://www.ti.com/docs/83guide.htm

<u>Bring your text and calculator to each lecture and discussion!</u>

<u>Math 243 – Schedule (tentative)</u>

* No classes – Friday, November 28 – Thanksgiving Holiday

<u>Week</u>	<u>Chapters covered</u>	<u>Discussion Session</u>	<u>Homework due</u>
1	1, 2, 3	No session	None
2	3, 8, 9	Quiz #1 (1, 2)	1, 2
3	9, 10	Quiz #2 (3)	3
4	11, 14	Quiz #3 (8, 9, 10)	8, 9, 10
5	15, 16	Quiz #4 (11, 14)	11, 14
6	Midterm, 18	Review	15
7	19, 20	Quiz #5 (16, 18)	16, 18
8	21, 4	Quiz #6 (19, 20)	19, 20
9*	5	Quiz #7 (21)	21
10	Review	Quiz #8 (4, 5)	TBA
11	Final Exam – Comprehensive		

<u>Exam Dates</u>
Midterm – Wednesday, November 5th (Chapters 1-3, 8-11, 14-15)
Final Exam – Thursday, December 11 at 3:15 pm (Comprehensive)

Homework Assignments:

The suggested exercises listed are strongly recommended but are not to be turned in. You should do these, as your ability to do them will be assumed, but you need not give them a formal treatment. The homework that is turned in will be graded carefully and strictly. Write neatly and staple all pages together. When submitting your work be sure to fold the paper lengthwise and print your name, ID number, Math 243- Your GTF's name, and the section numbers due on the top on the outside of the fold. *Homework is to be turned-in in discussion sessions . Late homework will not be accepted!*

Chapter	Suggested problems	To be turned-in
1	12, 13-22, 31, 32, 35	30, 34, 37, 42
2	3, 5, 7, 11, 13-22, 23, 29, 31	2, 6, 8, 10, 24, 30, 38, 40
3	3, 7, 9, 15-24, 27, 31, 33, 35, 41, 45	2, 4, 6, 30, 32, 34, 36, 40, 44
8	5, 15, 17-26, 27, 31, 39, 41, 43	6, 14, 28, 30, 34, 40, 42
9	9, 16-24, 29, 31	28, 32
10	13, 15, 17, 19-28, 31, 37, 39, 45	10, 12, 14, 30, 32, 40, 46, 48, 50, 52
11	1, 3, 9, 13, 17-24, 31, 33	2, 6, 8, 32, 34, 40
14	9, 11-20, 21, 23, 31, 35, 37	2, 6, 10, 22, 24, 30, 32, 36
15	5, 15, 21, 23, 26-35, 37, 39, 41, 43	6, 18, 22, 36, 38, 40, 44
16	5, 19-23, 29, 31, 33	2, 4, 30, 34
18	1, 3, 5, 9, 11, 13, 15-24, 25, 31, 35	4, 8, 12, 14, 26, 34
19	1, 5, 22-29, 39, 43	6, 8, 10, 40, 42
20	3, 5, 9, 13, 15, 17, 18-27, 31, 37	2, 6, 14, 16, 28, 32, 38
21	1, 3, 7-14, 17, 25, 26	2, 4, 6, 28, 30, 32
4	5, 11, 12-21, 25, 35	4, 6, 24, 26, 34
5	7, 9, 14-23, 25, 27, 31	4, 8, 10, 24, 26, 32

Extra help: If my office hours or your GTF's office hours don't work for you, we recommend that you try the free tutoring and help available in the Academic Learning Services (ALS), located on the ground floor of the PLC building. ALS also arranges small tutoring groups, and maintains lists of private student tutors. There is a fee for the last two services. Contact Doug Hintz at 346-3232 for ALS services. Also, I highly encourage you to study with other Math 243 students. Take time before or after class to connect with fellow students.

Academic Deadlines

Deadline	Last day to:
September 28:	Process a complete drop (100% refund, no W recorded)
October 5:	Drop this course (100% refund, no W recorded)
October 5:	Process a complete drop (90% refund, no W recorded)
October 6:	Drop this course (75% refund, no W recorded; after this date, W's are recorded)
October 6:	Process a complete drop (75% refund, no W recorded; after this date, W's are recorded)
October 8:	Add this course
October 8:	Last day to change to or from audit
October 12:	Withdraw from this course (75% refund, W recorded)
October 19:	Withdraw from this course (50% refund, W recorded)
October 26:	Withdraw from this course (25% refund, W recorded)
November 16:	Withdraw from this course (0% refund, W recorded)
November 16:	Change grading option for this course

⚠ You cannot drop your last class using DuckWeb. For assistance with a complete drop or a complete withdrawal, please contact the Office of Academic Advising, 364 Oregon Hall, 541-346-3211 (8 a.m. to 5 p.m., Monday through Friday). If you are attempting to withdraw after business hours, contact the office before noon the next business day.

Statistics on the TI-83

__Lists__ To display the stat lists, press $\boxed{\text{STAT}}$, and then select **1: EDIT** from the STAT EDIT menu.

To clear a list, use arrows to move the cursor to the list name, and then press $\boxed{\text{CLEAR}}$, then $\boxed{\text{ENTER}}$.

To enter data into a list, type the first number, press $\boxed{\text{ENTER}}$, type the next number, press $\boxed{\text{ENTER}}$, etc.

Wherever you are asked to specify a list, say list L_3, press $\boxed{\text{2nd}}$, then $\boxed{3}$.

__Drawing histograms__ Press $\boxed{\text{2nd}}$ then $\boxed{\text{Y=}}$; this equals $\boxed{\text{STAT PLOT}}$. Select the plot you want (presumably Plot 1) and be sure the other plots are Off; then press $\boxed{\text{ENTER}}$. The STATS PLOTS editor is displayed.

For each entry in the STATS PLOTS editor, make a selection, press $\boxed{\text{ENTER}}$, and then use the cursor to move to the next entry. Select On, then the type of plot (histogram), then the Xlist (L1, probably), and leave the Freq at 1. Press $\boxed{\text{ZOOM}}$; then scroll down to **9: ZoomStat** and press $\boxed{\text{ENTER}}$. You should see a histogram. As with any graph, hitting $\boxed{\text{TRACE}}$ will display all important values.

If you get an error instead of a histogram: (1) There is no data in the select list. or (2) You have more than one plot turned on.

IMPORTANT. Sometimes your window will not be well chosen. YOU will need to make the adjustments. To do this, press $\boxed{\text{WINDOW}}$ and you will see the current window settings. Xmin = should be at or below the lowest value in the list, and Xmax should be at or above the highest value in the list. Xscl is the class width. For Ymin, use a small negative number. Ymax (top of window) needs to be larger than the largest class frequency. Make Yscl=1 and Xres=1.

__Drawing boxplots__ Follow steps above except select boxplot as the type of plot (to scroll to the second line of choices, just keep scrolling to the right). Use the 2nd boxplot. Of course, you can easily draw your own boxplots, once you have the five-number summary. See next item.

__Statistics__ Press $\boxed{\text{STAT}}$, then select $\boxed{\text{CALC}}$; **1: 1-Var Stats** should be selected. Press $\boxed{\text{ENTER}}$. If your data is not in L1, enter the correct list. Then press $\boxed{\text{ENTER}}$ again. You will find all the data you need. To find the five-number summary, scroll down.

__Normal Distribution__ Press $\boxed{\text{2nd}}$ then $\boxed{\text{VARS}}$; this equals $\boxed{\text{DISTR}}$. Select **2: normalcdf**, then $\boxed{\text{ENTER}}$. To obtain the probability (area) between two values (called lower bound and upper bound), complete the following

`normalcdf(lower bound,upper bound,`μ,σ`)` and $\boxed{\text{ENTER}}$.

For example, if X is $N(100,10)$, then $P(98 < X < 101) = $ `normalcdf(98,101,100,10)` $\approx$ .1191. To get $P(X < 101)$, use `normalcdf(-1EE99,101,100,10)` to get $\approx$ .5398. NOTE that the EE is obtained by pressing $\boxed{\text{2nd}}$, then comma. Similarly we get $P(X > 98) = $ `normalcdf(98,1EE99,100,10)` $\approx$ .57926. The values $-1EE99$ and $1EE99$ play the role of $-\infty$ and ∞.

__tips.__ If you work with the standard normal where $\mu = 0$ and $\sigma = 1$, you don't need the last two entries. Also, you don't need the closing parenthesis. For example, `normalcdf(-1,1` gives $\approx$ .68269.

Here's how to solve normal questions in reverse, for example, $P(X < a) = .45$ for a where X is still $N(100,10)$. Press $\boxed{\text{2nd}}$ then $\boxed{\text{VARS}}$ to get $\boxed{\text{DISTR}}$. Select **3: invNorm**, then $\boxed{\text{ENTER}}$. Then complete the following

`invNorm(probability,`μ`,`σ`)` and ENTER .

For our example, `invNorm(.45,100,10)` gives $a \approx 98.74$. NOTE that this only works for $P(X < a)$. For similar problems, you need to manipulate them into this form. For example, $P(X > a) = .73$ is the same as $P(X < a) = .27$, so $a = $ `invNorm(.27,100,10)` ≈ 93.87.

Confidence Intervals In each case, press STAT and select TESTS . Then you have a big choice of "tests" and "intervals," both by scrolling up and down. "Tests" refer to hypothesis tests (see below) and "intervals" refer to confidence intervals. For each item, you first choose Inpt Data (if you are analyzing data on a list) or Stats (if you already have a summary of the data). Then you provide the list or the data indicated.

For example, look at Exercise 6.5(b) on page 308. Put the data in a list. Now press STAT , select TESTS and choose **7: ZIinterval**. Fill in the data: Inpt = Data, $\sigma = 15$, your list, leave freq at 1, C-Level = 99 (press ENTER after each entry, of course). Then calculate. The answer given is (98.899,112.78).

Now suppose we are given the same data in this form: $\sigma = 15$, $\bar{x} = 105.84$, $n = 31$ and the same confidence level (99%). Proceed as before up to Inpt = Stats. Provide the data; then calculate. The answer given is (98.901,112.78).

We've illustrated the first category below.
1. Confidence interval for μ, σ known. Use a z-interval, i.e., **7: ZInterval**.
2. Confidence interval for μ, σ unknown. Use a t-interval, i.e., **8: Tinterval**.
3. Confidence interval for $\mu_1 - \mu_2$, σ known. Use a z-interval, i.e., **9: 2-SampZInt**.
4. Confidence interval for $\mu_1 - \mu_2$, σ unknown. Use a t-interval, i.e., **0: 2-SampTInt**.
5. Confidence interval for p. Use a z-interval, i.e., **A: 1-PropZInt**.
6. Confidence interval for $p_1 - p_2$. Use a z-interval, i.e., **B: 2-PropZInt**.

Hypothesis Tests Procedure is similar to that above. In each case, a P-value is provided, from which the appropriate inferences can be made.
1. Hypothesis test for μ, σ known. Use a z-test, i.e., **1: Z-Test**.
2. Hypothesis test for μ, σ unknown. Use a t-test, i.e., **2: T-Test**.
3. Hypothesis test for $\mu_1 - \mu_2$, σ known. Use a z-test, i.e., **3: 2-SampZTest**.
4. Hypothesis test for $\mu_1 - \mu_2$, σ unknown. Use a t-test, i.e., **4: 2-SampTTest**.
5. Hypothesis test for p. Use a z-test, i.e., **5: 1-PropZTest**.
6. Hypothesis test for $p_1 - p_2$. Use a z-test, i.e., **6: 2-PropZTest**.

Two-variable Statistics First, press 2nd and 0 = CATALOG . Scroll down to DiagnosticOn and then hit ENTER twice and CLEAR .

For a scatter plot, go to STAT PLOTS as before, but now, under Type, select the scatterplot picture (the first one). Now you'll be asked for the two lists. Give the data. Press ZOOM ; then scroll down to **9: ZoomStat** and press ENTER . If needed, go to WINDOW and adjust the window appropriately.

To get the regression line on the same graph, press STAT , then select CALC , then select **4: LinReg(ax+b)** and press ENTER . If you are using lists L1 and L2, press ENTER again. Otherwise, first type your X-list, Y-list in that order separated by a comma, then ENTER . Now you have the equation of the regression line and the correlation r. Press Y= ; then press VARS . Select **5: Statistics** and ENTER . Select EQ. **1: RegEQ** should also be highlighted. Press ENTER . This has pasted the regression line into the function line. Now press GRAPH .