Math.1210 Management Precalculus
Fall 2016

Text: Harshbarger, **College Algebra In Context**, 5th edition, Pearson 2017, 2013, 2010; and the accompanying software MyMathLab.

Note: The loose-leaf version of the text and MyMathLab are packaged together at a reduced price. Online versions of the student solution manual and text are available with MyMathlab. The hard copy student solution manual will be available separately at the bookstore.

Goals and objectives: This management precalculus course is geared for non-science students. It is designed to show students how to analyze, solve and interpret real life applications from the management , life, and social sciences. Problem solving in meaningful contexts is been emphasis. Graphical understanding of the precalculus concepts with use of a graphing calculator will also be incorporated.

The strategies will consist of applications to the mathematical concepts as they are developed through graphical, numeric and analytic procedures. The primary objectives include:

- Mastery of algebra prerequisites: - Each chapter begins with an Algebra Toolbox section which reviews previously learned algebra concepts by presenting the prerequisite skills needed for successful completion of the chapter.
- Function definition and linear functions: - Mathematical concepts will be developed for functional notation and examples presented for linear functions. Data will be presented and linear models developed with the aid of graphing calculator technology.
- A mastery of covered material will be encouraged with a greater emphasis on daily assigned homework and text based online homework.

Grading policy: A combination of MyMathLab online homework, additional assigned homework from textbook as listed in the syllabus, and projects will be given following material coverage and review. MyMathlab on line homework and textbook homework will be assigned and due weekly. These homework and projects will account for 20% of the grade (10% online homework, 5% textbook homework, and 5% projects). The Excel based management projects will be included as part of the homework grade. Hard copy of the MyMathLab assignments with detailed mathematical explanations should be maintained by students. Based on vacations and other extenuating circumstances, due dates will be adjusted. There will be weekly (approximately 10) short quizzes (1 or 2 problems to be done within 10 minutes) during the semester accounting for 10% of the grade. The quizzes will be based on online MML homework and additional assigned homework as listed in the syllabus or assigned by your instructor. There will also be two examinations, each during a class period. Each of these examinations will account for 20% of the grade. The comprehensive two hour common final examination will be worth the remaining 30% of the grade. One half of an 8.5 by 11 sheet of paper with notes on both sides will be allowed for the common final. At the discretion of the individual instructors, the crib sheet may be allowed for in class exams and bonus points may be included in the total. Participation in class will be recognized as an asset in final grade evaluation. Graphing calculators can be used on all exams.

The MAST Module 2004-2005 material at http://faculty.uml.edu/mstick/92.122/material.htm will be used as a resource for projects. It is the responsibility of each student to be present for each examination. Only validated exceptions will be allowed.

A guideline for course grade assignment will be:

FINAL AVERAGE	94-100	90-93	86-89	81-85	77-80	74-76	70-73	66-69	63-65	56-62	0-55
	A	A-	B+	B	B-	C+	C	C-	D+	D	F

Supplemental Instruction: During the first week of class, a placement exam will be given. The exam will be based on mathematics material students are expected to be familiar with. The topics include: polynomials, solution of linear and quadratic equations, factoring, absolute value, inequalities, exponents and radicals. Based on student performance, recommendations and placement will be made into the Management Precalculus supplemental instruction class MATH. 1210SI which will meet one hour per week. Other students wishing to voluntarily enroll in MATH.1210SI are welcome. Grades in a supplemental instruction class are part of a student's GPA, but the one credit earned does not count towards graduation requirements.

Future Enrollment in Management Calculus MATH.1220: Students must receive grades of C- or better in Management Precalculus MATH.1210 in order to take MATH.1220. This applies to day and continuing education students. For students getting D+ or D in MATH.1210, the Department of Mathematical Sciences will offer a Boot Camp. There will be no grade change, but students getting a grade of 70% or above on the Boot Camp final will be allowed to move on to MATH.1220. Others must repeat MATH.1210.

Attendance policy: Students are expected to attend all classes and are responsible for all material covered. A missed homework, late lab assignment or missed examination will result in a **zero** grade unless prior arrangements or acceptable written documentation is provided. Details of the attendance policy follow:

1. Attendance is required;
2. Students are allowed ONE unexcused absence;
3. Additional absences are excused only if the request is accompanied by a Doctor's note or a note from the Dean of Students on appropriate letterhead. This encompasses all situations and unforeseen hardships (accidents, illness, death of a relative, etc.);
4. ONE point will be deducted from the student's final course average per unexcused absence (minus the one allowed);
5. To monitor attendance, at the instructor's discretion, each student will **sign** his or her name to a daily attendance sheet. No signature will be accepted for any student entering class after the first 15 minutes of scheduled class time and no sign-in for a particular class will be allowed other than the day of that class.

Assuming eligibility, at least two weeks prior to any announced exam, arrangements must be made with the instructor for extended time. Extended time will refer to time allotted on the day of the scheduled exam. In the case of the final exam, arrangements must be made at least two weeks prior to the end of scheduled classes.

Procedures about academic integrity are described in the university catalog at http://www.uml.edu/Catalog/Undergraduate/Policies/Academic-Policies/Academic-

Integrity.aspx. As necessary, sanctions may be imposed on any student who has committed an act of academic dishonesty. In such cases, the student will be informed within 14 days after the incident has been recognized and the provost's office will be notified within 10 days after student notification.

University retention policy has requested that there be a bi-weekly evaluation of student attendance, performance, and behavior in class. It will be implemented. The purpose of this evaluation is to inform the university administration of student status in this course and enable them to provide timely feedback as necessary to students.

Technology: The TI-84 Plus Silver Edition or equivalent will be used throughout the course as a visual aid for learning. Excel will be used for the assigned projects. While technology will be used, students are responsible for mastery of analytic procedures presented. The course text contains two technology appendices: A Basic TI-84 Calculator Guide in appendix A pages 616-634 and a Basic Guide to Excel 2003, 2007 and 2010 in appendix B pages 635-651. Both of these appendices are available in the hard copy edition of the text and online in MML (chapter contents -> appendices). In addition, in MML (tools for success -> graphing calculator help menu) the graphing calculator manual link has examples for both the TI-84 and Excel.

Projects

The two Excel based projects will focus on applications of linear equations and linear least squares regression. The data used is from the Methuen Wal*Mart store in fiscal 2002-2003 and fiscal 2003-2004. Wal*Mart's fiscal year starts with the first week of February, so week 1 in 2002 in the first week in February and week 52 (or week 53 based on round off) occurs during the last week of January in 2003.

Project 1: Use the data at http://faculty.uml.edu/mstick/92.122/material/Walmart dry goods weekly sales.htm.

Generate supporting Excel spreadsheet(s) and graphs to answer the following questions for the Dry Goods 2002-2003 data.

1. Can you identify holiday periods or special events that cause the spikes in the data?
2. What holiday results in the maximum sales for this department?
3. Generate several linear models for this data and discuss the rational behind the model that you believe best predicts future results.
   a) For each linear model, discuss the meaning of the slope and y intercept. Also provide an analysis as to why you like or dislike this particular model.
   b) Using your most preferred linear model, predict sales for the next four weeks. Provide backup computation.
4. Based on your favorite linear model selected, compute the percent rate of increase $(y_2 - y_1)/y_1$ for the next four weeks.

Project 2: Use the data at http://faculty.uml.edu/mstick/92.122/material/Walmart boxed foods weekly sales.htm. This data is actually a subset of project one data.

Generate supporting Excel spreadsheet(s) and graphs to answer the following questions for the Boxed Foods 2002-2003 data.

1. Generate a linear least squares regression model for this data.
   a) What do the slope and y intercept values mean for this model?
   b) Do you feel that this model predicts future trends and explain your rational.
2. Boxed Foods data is a subset of the Dry Goods data.
   a) Use your model for the Boxed Foods data set to predict sales for the next four weeks. Provide chart and model backup for predictions.
   b) Compute the percent rate of increase $(y_2 - y_1)/y_1$ for the next four weeks using results from question 2, part a). Provide appropriate backup material.
   c) Generate a linear least squares model for the Dry Goods data in project one. Discuss the percent rate of increase $(y_2 - y_1)/y_1$ for the next four weeks using the least squares models for both the Boxed Foods and the Dry Goods data. What, if any, are major differences found?

Syllabus

MATH.1210 Management Precalculus

Use the TI to support data analysis problems, rational functions and graphs in section 6.5.

Section	Topic	Exercises
Chapter 1	Functions, Graphs, and linear Models	Text
Algebra Toolbox		MML #1, 12, 14, 36, 39, 41
1.1	Functions and Models	MML #1, 2, 8, 22, 30, 63
1.2	Graphs of Functions	MML #2, 6, 32, 45
1.3	Linear Functions	MML #2, 8, 56
1.4	Equations of Lines	MML #2, 4, 10, 12, 28, 30, 52
Chapter 2	Equations	Text
Algebra Toolbox		MML #3, 14, 16, 23, 24
2.1	Solving Linear Equations	MML #3, 7, 16, 39, 60, 81
2.2	Modeling Linear Functions	MML #3, 15, 16, 17, 18, 35
2.3	System of Linear Equations in Two Variables	MML #4, 10, 27, 38, 40, 52
Chapter 3	Quadratic Functions	Text
Algebra Toolbox		MML #4, 6, 11, 40, 42
3.1	Quadratic Functions, Parabolas	MML #5, 16, 26, 60
3.2	Solving Quadratic Equations	MML #5, 8, 10, 34, 41, 64
3.3	Piecewise-Defined Functions and Power Functions	MML #5, 1, 56
3.4	Quadratic and Power Models	MML #6, 24
Chapter 4	Additional Topics with Functions	Text
Algebra Toolbox		MML #6, 2, 6, 22
4.1	Transformation of Graphs	MML #6, 9, 12, 18, 40
4.2	Combining Functions; Composite Functions	MML #7, 6, 16, 20, 40
4.3	Inverse Functions	MML #7, 6, 12, 25
Chapter 5	Properties of Exponents	Text
Algebra Toolbox		MML #8, 2, 14,16, 38

Chapter 6	Higher Degree Polynomial and Rational Functions	Text
Algebra Toolbox		MML # 8, 6, 16, 20, 32, 37
6.1	Higher-Degree Polynomial Functions	MML #8, 6, 7, 10, 39
6.3	Solution of Polynomial Equations	MML #9, 8, 12, 16, 38
6.5	Rational Functions	MML #9, 4, 17, 34, 45

Chapter 7	Systems of Equations and Matrices	Text
Algebra Toolbox		MML #10
7.1	Systems of linear Equations in Three Variables	MML #10, 12, 32
7.2	Matrix Solution of Systems of Linear Equations	MML #10, 18, 34

The following should serve as a guide for exam and topic coverage.

Week	Sections to be covered
1	MML #1 assigned, Algebra Toolbox (Chapter 1), 1.1, 1.2
2	MML #2 assigned, 1.3, 1.4, Project 1 assigned
3	MML #3 assigned, Algebra Toolbox (Chapter 2), 2.1, 2.2
4	MML #4 assigned, 2.3, Algebra Toolbox (Chapter 3)
5	Review, Exam 1, Project 1 Due
6, 7	MML #5 assigned, 3.1, 3.2, 3.3, Project 2 assigned
8	MML #6 assigned, 3.4, Algebra Toolbox (Chapter 4), 4.1
9	MML #7 assigned, 4.2, 4.3
10	Review, Exam 2, Project 2 Due
11	MML #8 assigned, Algebra Toolbox (Chapter 5), Algebra Toolbox (Chapter 6), 6.1
12	MML#9 assigned, 6.3, 6.5
13	MML #10 assigned, Algebra Toolbox (Chapter7), 7.1, 7.2
14	Review For Final Exam

Graphing Calculator Implementation

Systems of Equations

The following approach can be used for n by n systems of equations.

- $ax + by = c$
  $dx + ey = f$
- $y_1 = y_2$: 2nd CALC intersect
- $AX = B$
  $X = A^{-1}B$

ex: $3x + 2y = 7$
$5x - y = 3$

a) MATRX, -> to EDIT, 1 to edit matrix A
b) 2 enter (row), 2 enter (column)
3 enter 2 enter
5 enter -1 enter to define matrix A then 2nd QUIT
c) MATRX, -> to EDIT, 2 to edit matrix B
d) 2 enter (row), 1 enter (column)
7 enter
3 enter to define matrix B then 2nd QUIT
e) to compute $X = A^{-1}B$, MATRX 1 (i.e. matrix A), x^{-1} (inverse of A),
* (multiplication symbol is optional) MATRX 2 (i.e. matrix B), enter

output is $\begin{bmatrix} 1 \\ 2 \end{bmatrix}$

f) MATRX, 1, x^{-1} enter, yields A^{-1}

ex: show that $AA^{-1} = I = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$: MATRX, NAMES, 1 (i.e. matrix A)

then * (optional), MATRX, NAMES, 1 (i.e. matrix A), x^{-1} (inverse of A), enter

Linear Regression

ex: Model the Dow Jones (D.J.) weekly data with a linear regression model $y = ax + b$.

a) STAT, EDIT to create data

$L_1(time)$	$L_2(D.J.)$	$L_1(time)$	$L_2(D.J.)$
1	18075	6	18150
2	18025	7	18125
3	18050	8	18225
4	18050	9	18250
5	18100	10	18325

b) Invoke the linear regression procedure by pressing STAT, CALC, then option 4 for LinReg(ax+b). The steps appear in item c below.

c) STAT, CALC, LinReg(ax+b).

d) After LinReg(ax+b) appears, we want to access the x data in list 1, the y data in list 2, and store the results in equation y_1 (To get y_1 to appear, press VARS, then Y_VARS, then 1 for Function and 1 again for y_1). The result will appear as L_1, L_2, y_1 and then press enter.

e) Next we want to turn on the STAT PLOTS. Do this by pressing 2nd STAT PLOT, option 1, on.

f) Finally to get the plot of the actual data and regression equation, press ZOOM, option 9.

g) When done, be sure to turn off plot 1 at y=screen or at STAT PLOT. If not turned off, you will not be able to graph other functions.

For newer operating systems on the TI-84, the regression procedure looks a bit different. Step d) takes on a new look. After pressing LinReg(ax+b), the TI-84 screen appears as

LinReg(ax+b)

Xlist: L_1 (L_1 is the default for x data and just press the down arrow)

Ylist: L_2 (L_2 is the default for y data and just press the down arrow)

FreqList: (just press the down arrow to bypass this option)

Store RegEQ: y_1 (repeat the procedure in step d) above to store the equation in y_1 and then press the down arrow)

Calculate: press enter (to get the results)