MA 351 Spring 2016 Assignments

For Thursday 1/14:

Lecture 1: Read Pages 1-9

Assignment: Exercises p. 15: 1(b), 2, 3, 4, 5(a)-(e), 7, 12, 13(a), 14

For Tuesday 1/19:

Lecture 2: Read Pages 10-11, 27-29

Assignment: T-F Questions p. 14: 1, 3, 5, 9, 12

In general, for True-False questions, you should explain why your answer is correct. However, you do not need to give proofs or counter examples.

Exercises: p. 15: 8, 9, 10, 13(b), (c), 15, 17, 20(a), 24, 25(a), (b), 28, 30, 31, 34 (a)-(e), (g), 40, 43

p. 36: 1, 2

For Thursday 1/21:

Lecture 3: Read Pages 29-35

Assignment: T-F Questions p. 14: 2, 4, 6, 8, 10

Exercises: p. 15: 11, 14, 18, 19, 25(c), (d), (e)

p. 36: 7(a)(See the work following (1.13) on p. 30 for this and the
following problems) 7(b), 8(d),(e),(h), 9(a),10(a),12(a),(b), 13(a) Rank 2 case,13(b),15

For Tuesday 1/26:

Lecture 4: Read Pages 45-55

Assignment: T-F Questions p. 35: 1-7

Exercises:

p. 59, : 1, 2 (Bring the matrices into Reduced Echelon form), 3(a),(c),(e),(g),4(a),(c),(e),(g), 5(a) (See Example 3 on p. 53.)

For Thursday 1/28:

Lecture 5: Read Pages 71-78

Exercises: p. 59, : 3(b),(d),(f),(h),(j),4(b),(d),(f),(h),(j), 5(c), 6(a),20(a),(c), 25, 26,29, 33 (Hint: The system is equivalent with the system below.) Also in 33, write the general solution using z and w as free variables. The point here is that there are many different, but equivalent, ways of describing the solution. (Ans: $[x, y, z, w]^t = z[-1, -2, 1, 0]^t + w[-1, -1, 0, 1]^t$.)

\[
\begin{align*}
z + w &= -x \\
2z + w &= -y
\end{align*}
\]

p. 81 : 1,2(a) (b), 3(a), 7

Note: The answer to 7 in the back of the book is incorrect because some of the entries are equal. But you should be able to fix this.

For Tuesday 2/2:

Lecture 6: Read p. 79-80, 97-100

Exercises:
p. 59: 7, 8, 21, 22, 23 (Your “proof” will really be an explanation.)
p. 82, : 8, 9, 16, 19 (Hint: See the solution to problem 20 in the back of the book), 22c, 24
p. 107, 1 (a), (d), (g) Note The ”basis” will consist of the pivot elements.

**For Thursday 2/4:**

Lecture 7: Read p. 100-106, p. 113-117.

**Assignment:** T-F Questions p. 81: 7, 8, 9, 10, 12

**Exercises:**

p. 81, 14(a),(b), 17, 22(e), 28 (upper triangular is defined in problem 27) , 30(c)(Hint: See the solution to problem 30(b). Here $C^\infty(\mathbb{R})$ is the set of infinitely differentiable functions on $\mathbb{R}$.)

p. 107, 1 (e) Note The ”basis” will consist of the pivot elements. 3(a), 4, 12

*In all of the above problems you MUST use the technique illustrated in Examples 1-3 on p. 99-100. Thus, in problem problem 3, you should ignore the instruction to use Theorem 5.*

p. 122, 6(b) [Hint: Begin by expressing $W$ as a span. It is not necessary to use the subspace properties in this problem. See the hint at the back of the text.], 8, 18

**For Tuesday 2/9:**

Lecture 8: Read p. 117-120

**Assignment:** T-F Questions p. 81: 3, 5 Hint: The answer is “True.” But, why?

**Exercises:**
p. 81, : 12, 13 (Hint: The reduced form of $A$ may be read off of the work on p. 51), 14(c)(Hint: The coefficient matrix can be as in 14(b)), 27, 29, 30(a), 31(a), 36, 39

p. 107, 1 (f), (i) Note The “basis” will consist of the pivot elements. 3 (c), (e), 9.

In all of the above problems you MUST use the technique illustrated in Examples 1-3 on p. 99-100. Thus, in problem problem 3, you should ignore the instruction to use Theorem 5.

p. 122, 6(a), 8, 18, 10, 19(b), 20(b)

For Thursday 2/11:

Lecture 9:

Read p. Read p. 139-145

Assignment: T-F Questions p. 106 1, 2(b), (e), 4, 7

p. 107, 3(d), (f), 14

p. 149: 1, Hint: Do Exercise 2 first. The non-zero rows of the row reduced echelon form are a basis of the row space. Attempt to express $X$ and $Y$ as linear combinations of these rows.

2, 4, 5a, 6a, 17(a), (c), (e), (f) NO ROW REDUCTION IS ALLOWED IN THIS PROBLEM Hint: Look at the columns of $A$. For (c), think about the dimension of the column space.

For Tuesday 2/16:

Read p. 155-161

Assignment:

T-F Questions p. 107 3, 8
T-F Questions p. 120 1, 2, 4, 5, 9
Exercises p. 121, 4, 5a, 14, 19c, 21 (Hint: Use Theorem 3, p. 118), 24, 25, 32

p. 149 5d, 6d, 17(b),(d),15, rows 2-5. Hint: For an $m \times n$ matrix $A$
“Always Solvable” means that the dimension of the column space is $m$ and
“Unique Solution” means that the null space is $\{0\}$, 18 NO ROW REDUCTION IS ALLOWED IN THIS PROBLEM, 21, 22, 23

For Thursday 2/18:

Exercises
p. 162, 1a,b, 2a,b, 3, 11, 14 Note: See Definition 3, p. 158. $[3, -5]$ should
15, 20b (Hint: You should use Definition 3, p. 158. See the solution to 20a), 22

For Tuesday 2/23:


Assignment:

p. 162, 1c,d, 4, 6, 7, 16, 24a,b,c, 26
p. 183, 1, 3, 4, 5, 17, 21

For Thursday 2/25: No assignment due to test.

For Tuesday 3/1:

Read p. 243-249

Assignment:

p. 198, 3a, b, c, 4a, b, 5c “noninvertibleinvertible” should say, “noninvertible”
Remark. You can do these exercises on a computer. For example the “double matrix” on the bottom of page 192 can be entered into a computer as the $3 \times 6$ matrix

$$D = \begin{bmatrix} 1 & 2 & 1 & 1 & 0 & 0 \\ 1 & 3 & 4 & 0 & 1 & 0 \\ 2 & 4 & 1 & 0 & 0 & 1 \end{bmatrix}$$

Then ask the computer to compute $RREF(D)$ The answer will be the last double matrix on p.183.

You are of course not allowed to do these exercises using the inverse command.

For Thursday, 3/3:

p. 198, 3f, g, h Note: You may use a computer to do the row reduction. But do not use the “inverse” command to find the inverse. 4f, g, h, 6 g, 15, 16, 19 (There is a hint on p. 465 which is mistakenly labeled “20.”) 24

p. 252 Note: The answers are on p. 467 under Section 4.1.1
1a, c, i, 2c, 3c

For Tuesday, 3/8:

p.198, 17, 21, 22, 25, 27(a), (b),

p. 252 6

p. 261, 1a,c,e, 5a, 8

p. 271, In in all of these problems, except 4, express the answer as a ratio of determinants. Do Not Compute The Determinants.

1,2, 3, 4(Compute the determinants here).

For Thursday, 3/10:

No Class. (Compensation for evening exam).
For Tuesday, 3/15 and Thursday 3/17:

No Class. (Spring Break).

For Tuesday, 3/22:

No Class. (Compensation for evening exam).

For Thursday, 3/24:

p. 198, 18 (Hint: \( A^{-1}A = I \). See Equation (3.21) on p. 196.) 23

p. 261, 14, 15, 16

p. 271, In in all of these problems, if possible, express the answer as a ratio of determinants. Do Not Compute The Determinants.

5, Exercises 1(a), (c) ,6

p. 282 1a, c Hint: If \( AX = \lambda X \) then \( X \) is an eigenvector with eigenvalue \( \lambda \).
6(a) (See Example 2 on p. 277).

For Tuesday, 3/29:

No assignment: Study for Exam

For Thursday, 3/31:

Read p. 292-294

Assignment:

p. 282, 1b, 3b, 4 Hint: Linear combinations of eigenvectors corresponding to the same eigenvalue are eigenvectors. 6b,e, 7b (Hint The characteristic polynomial is \( p(\lambda) = - (\lambda - 1)(\lambda - 2)^2 \) , c, 9

For Tuesday, 4/5:
p. 295, 1a

p. 282, 3c, 5, p. 297, 9.

p. 309 2 (Do not compute $A^{20}$. Instead find complex matrices $Q$ and $D$

such that $A = QDQ^{-1}$), 3

For Thursday, 4/7:

Assignment:

Exercises

p. 282, 12

p. 295, 5, 6, 10, 12

p. 235, 4b,c

For Tuesday, 4/12:

p. 282, 13

p. 235, 4d, 5b,c, 6a,c, 17 c,e, 18 c,e (See Example 7, p. 229), 20c

For Thursday, 4/14:

p. 285, 15

p. 297 13

p. 235 7a, 13a (See p. 230), 17d, 20d

p. 321, 1a, c, 2a,c,e, 7, 9
For Thursday, 4/21:

p. 297 14, 15
p. 321, 10, 12, 14, 17
p. 335, 1, 2, 5a, c

For Tuesday 4/26

p. 335, 3a, b, c, d, 10, 12
p. 321, 12, 13, 14
p. 373 1, 3(a)

For Thursday 4/28

No homework. Review for final