Introduction to Mathematics for Elementary Teachers

Course Description
Elementary concepts of sets, numeration systems, number theory, and properties of the natural numbers, integers, rational, and real number systems with an emphasis on problem solving and critical thinking.

http://www2.sfasu.edu/math/courses/syllabi/MTH127Syllabus.pdf

Course Prerequisites
Two years of high school algebra and one year of high school geometry.

Course Time and Meeting Place
- MTH 127 Section 006 meets in Math 209 at 2:00 – 3:15 TR.

Instructor
- Stacia Prince
  Department of Mathematics and Statistics
- Office: Math 334
- TEL: (936) 468-6262
- Email: sprince@sfasu.edu

- Office Hours:
  Monday: 4-5
  Tuesday: 9:30-11:00
  Wednesday: 11-12
  Thursday: 9:30-11:00
  Additional office hours by appointment

Current Text and Materials
The textbook for this course is
Mathematics for Elementary Teachers, Beckmann 0321901231 Pearson 5th

Course Goals
- To understand the mathematics essential to successful teaching in the elementary school classroom.
- To acquire a foundation in numeration systems, number theory and properties of the natural numbers, integers, rational, and the real number system.
- To gain skill in problem solving and critical thinking.

Student Learning Outcomes (SLO):
At the end of MTH 127, a student who has studied and learned the material should be able to:
1. Solve a variety of problems using multiple problem-solving techniques. [CO 1,3]
2. Demonstrate understanding of core concepts underlying standard and non-standard algorithmic procedures for performing operations on subsets of real numbers. [CO 1,3
3. Communicate his/her knowledge effectively in multiple formats – verbally, concretely, and in writing. [CO 2]
4. Define, identify, and use the fundamental properties of real number operations. [CO 3]
5. Provide logical justification of mathematical thinking. [CO 1]
6. Use mathematical language and notation appropriately to communicate ideas. [CO 2]

Program Learning Outcomes
This is a general education core curriculum course and no specific program learning outcomes for this major are addressed in this course.

Calculators
Calculators will not be used in this course.
Homework

Online homework is required using WeBWorK. Homework will also be assigned from our textbook and turned in at the beginning of the class. Your daily average is based on your grades from WeBWorK homework, homework from the textbook, and any other daily grades that are assigned for a grade.

Grading and Exams

There will be three 75 minute exams during the semester and a 2 hr. comprehensive final exam. Your course grade will be determined as follows:

<table>
<thead>
<tr>
<th>Component</th>
<th>Date</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Online Homework</td>
<td>WeBWorK assignments</td>
<td>5%</td>
</tr>
<tr>
<td>Textbook Homework</td>
<td>Class assignment due according to dates on calendar</td>
<td>15%</td>
</tr>
<tr>
<td>Exam I</td>
<td>Tuesday, September 19, 2017</td>
<td>20%</td>
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<td>Exam II</td>
<td>Thursday, October 19, 2017</td>
<td>20%</td>
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<td>Exam III</td>
<td>Tuesday, November 9, 2017</td>
<td>20%</td>
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<tr>
<td>Final Exam</td>
<td><strong>Tuesday, December 12, 2017, at 6:45-8:45 PM in Kennedy Auditorium</strong></td>
<td>20%</td>
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</tbody>
</table>

Semester numerical scores will be converted into letter grades according to the following method.

<table>
<thead>
<tr>
<th>Range of numerical values</th>
<th>Corresponding Letter</th>
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<tbody>
<tr>
<td>90-100</td>
<td>A</td>
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<tr>
<td>80-89</td>
<td>B</td>
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<tr>
<td>70-79</td>
<td>C</td>
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<tr>
<td>60-69</td>
<td>D</td>
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<tr>
<td>0-59</td>
<td>F</td>
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</tbody>
</table>

When we calculate your final grade at the end of the course, we will calculate a score on a 0-100 point scale using the scores that you have obtained during the course, and the grade breakdown given above. Your course grade will then be obtained using this table.

*Resurrection Policy.* If you score a 70 or better on the final exam, we will replace your lowest midterm grade with your final exam grade if the midterm grade is lower. The resurrection policy does not apply to your homework or WeBWorK grade.

Important Information about the Math 127 Final Exam

The final exam for all MTH 127 classes is on **Tuesday, December 12, 2017, at 6:45-8:45 PM in Kennedy Auditorium**. Students having another exam at this time will schedule an earlier time to take the MTH 127 final.

*Cell phone use is not permitted in or out of the classroom during all exams. If you bring your cell phone to the exam venue, please remember to turn it off. Violation of this policy will be considered as academic dishonesty and dealt with accordingly. You will not be permitted to use your cell phone as a calculator, so plan ahead.*

Exam Policy

Exams are scheduled far in advance, and it is impossible to move the time or date. However, in rare cases where it is impossible for an individual to take the exam at the scheduled time, we will work with you to make other arrangements. Exceptions for taking the exam out of sequence are the following:

1. A medical excuse. Please provide proper documentation according to university rules.
2. A University sponsored event such as an athletic tournament, a play, or a musical performance. Your coach or director must contact us in advance. Athletic practices and rehearsals do not fall into this category.
3. A religious holiday. Please send a short email explaining the situation.
4. Extreme hardship such as a family emergency. Please have the proper university office notify us.
The above are the only allowable excuses for taking the exam before the scheduled time. Under no circumstances do we give late exams. Since we can only accommodate a limited number of students taking the exam at an earlier time, please make sure that you fall into one of the above categories before you contact us. If you miss an exam due to illness or a family emergency, you will not be penalized. The missed exam will be replaced with the final exam grade. If you have a conflict with the final exam (other than another exam at the same time), you must contact the Registrar. Only the Registrar can schedule an out-of-sequence final exam.

Making Your Homework Easy to Read and Easy to Grade

- Make sure your handwriting is legible.
- Homework with multiple pages should be stapled in the upper left-hand corner.
- In the upper right-hand corner you should write (in this order)
  - Your name
  - MTH 127.006
  - The homework set number
  - The due date of the homework
- Problems should be clearly labeled and numbered on the left side of the page. There should also be a visible separation between problems. *Don't forget to staple your homework together if you are submitting several pages.*
- You should leave the entire left margin blank so that the grader can use this space for scoring and comments.
- To ensure that each problem is graded, problems and solutions should be written in the order that they are assigned.
- It is good practice to first work out the solutions to homework problems on scratch paper, and then to neatly write up your solutions. This will help you turn in a clean finished product.
- You should write up your solutions by yourself. You should always acknowledge any help received at the top of the assignment or in the right-hand margin.

The Classroom

Any questions you ask in class will likely be ones that other students will want answered as well, so get over any hesitation you might have and ask questions as the material is presented. You will not be penalized for doing this, no matter how trivial or simple you think your questions might seem. Remember, the class is being held for you to learn the material, not just to give you a time to copy notes off of a blackboard, so be sure to get help when you need it and stay involved in your class. *Please be respectful of your fellow students and your instructor. Cell phone use and texting are not allowed in class. Remember to turn your cell phone off or place it in quiet mode before entering the classroom.*

Getting Help with Math 127

- Individual and group help is available at the Academic Assistance and Resource Center, which is located on the first floor of the Steen Library.
- Take advantage of office hours.
- The SI for Math 127 will be announce during class.

Add/Drop Policy

The Add/Drop Policy can be found at [http://www.sfasu.edu/policies/add_drop.asp](http://www.sfasu.edu/policies/add_drop.asp)

Attendance Policy

Regular attendance is expected in Math 127. Attendance and Excused Absences Policy can be found at [http://www.sfasu.edu/policies/class_attendance_excused_abs.asp](http://www.sfasu.edu/policies/class_attendance_excused_abs.asp)

General Education Core Curriculum

This course has been selected to be part of Stephen F. Austin State University’s core curriculum. The Texas Higher Education Coordinating Board has identified six objectives for all core courses: Critical Thinking Skills, Communication Skills, Empirical and Quantitative Skills, Teamwork, Personal Responsibility, and Social Responsibility. SFA is committed to the improvement of its general education core curriculum by regular assessment of student performance on these six objectives.

Assessment of these objectives at SFA will be based on student work from all core curriculum courses. This student work will be collected in D2L through LiveText, the assessment management system selected by SFA to collect student work for core assessment. LiveText accounts will be provided to all students enrolled in core courses through the university technology fee. You will be required to register your LiveText account, and you will be notified how to register your account through your SFA e-mail account. If you forward your SFA e-mail to another account and do not receive an e-mail concerning LiveText registration, please be sure to check your junk mail folder and your spam filter for these e-mails. If you have questions about LiveText call Ext. 1267 or e-mail [SFALiveText@sfasu.edu](mailto:SFALiveText@sfasu.edu).
No Core Objectives are being assessed this semester.

**Core Objectives (CO):**

1. **Critical Thinking** [CO 1]: to include creative thinking, innovation, inquiry, and analysis, evaluation and synthesis of information
2. **Communication Skills** [CO 2]: to include effective development, interpretation and expression of ideas through written, oral and visual communication
3. **Empirical and Quantitative Skills** [CO 3]: to include the manipulation and analysis of numerical data or observable facts resulting in informed conclusions

**Course Outline:**

- Techniques of problem solving and estimation skills [CO 1, 2, 3] 10%
  
  *The following topics will be threaded throughout the course in order to develop the habits of mind necessary in mathematics:*
  
  - Introduce Polya’s Problem Solving Process: Understand the Problem, Devise a Plan, Carry Out Plan, Look Back
  - Explore Basic Problem Solving Strategies
  - Explore Patterns in Language, Figures, Numbers, Sequences and Geometry
  - Develop Estimation Skills with Mental Arithmetic

- Sets and Logic: An Introduction [CO 1, 2, 3] 15%
  
  - Classify and Sort Objects According to Attributes
  - Introduce the Language of Logic Connectives: And, Or, Not, Implies
  - Use Venn Diagrams as Problem-Solving Tools
  - Introduce Set Terminology and Notation
  - Explore Set Relations, Operations, and Properties
  - Introduce Functions as Sets

- Whole Numbers and Numeration: Concepts and Algorithms [CO 1, 2, 3] 20%
  
  - Define the Set of Whole Numbers
  - Model Whole Number Operations using a Variety of Methods
  - Verify Properties of Operations: Binary Operation; Closed, Commutative, Associative, Distributive - Multiplication over Addition, Identities, Multiplication by Zero; Division Algorithm
  - Explore Place Value Systems using Base Five Arithmetic
  - Develop and Apply Algorithms for Whole Number Operations
  - Develop Definition and Properties for Whole Number Exponents

- Number Theory: An Introduction [CO 1, 2, 3] 10%
  
  - Define and Explore Primes and Composites
  - Explore Basic Divisibility Properties of Sums and Products
  - Explore Applications of the Fundamental Theorem of Arithmetic
  - Define the GCD and LCM and Use Algorithms for Finding Each
  - Explore Applications of the GCD and LCM

- Integers: Concepts and Algorithms [CO 1, 2, 3] 20%
  
  - Model Integer Operations Using a Variety of Methods
  - Investigate Extensions of Whole Number Operations and their Properties: Closed, Commutative, Associative, Distributive- Multiplication over Addition, Identities, Additive Inverse, Multiplication by Zero
  - Define Absolute Value
  - Revisit The Division Algorithm

- Real Numbers: Concepts and Algorithms [CO 1, 2, 3] 20%
  
  - Investigate Practical Uses for Fractions
  - Explore Connections between Fractions, Rational Numbers, Decimals, and Percents
  - Investigate Rational and Irrational Number Representations
  - Explore Concepts and Define/Demonstrate Properties of Rational Number Operations to Include: Additive Inverse, Addition Property of Equality, Multiplicative Identity, Multiplicative Inverse, Distributive Property of Multiplication over Addition, Multiplicative Property of Equality, Multiplicative Property of Zero
  - Investigate Order and Operations in Decimal Form
• Investigate Irrational Number Order and Operations: Illustrate the Pythagorean Theorem
• Define and Demonstrate Properties of Real Numbers: Closure, Commutative, Associative, Distributive, Identity, Inverse, Density
• Develop Proportional Thinking to Include Ratio and Proportion, Properties of Proportions, Fundamental Law of Fractions

• Explicit instruction in Critical Thinking, Communication and Empirical and Quantitative Reasoning is in addition to implicit instruction, modeling and practice that occur daily in the discussion of numbers and operations. This explicit instruction includes explanation of solving mathematical problems by thinking critically, communicating logically ordered solutions with complete and correct notation, and applying empirical or quantitative skills as appropriate to the problem.

5%

Academic Integrity (Policy A-9.1)
Academic integrity is a responsibility of all university faculty and students. Faculty members promote academic integrity in multiple ways including instruction on the components of academic honesty, as well as abiding by university policy on penalties for cheating and plagiarism.

The penalty for a student found cheating on any part of an assignment, quiz, or exam in this class will range from a grade of zero on the work to a grade of F in the course, and may result in additional, more severe disciplinary measures. A student who allows another to copy his work and the student copying the work are both guilty of cheating. Do your own work. Do not show your completed work to others. Do not allow others to copy your work.

Definition of Academic Dishonesty
Academic dishonesty includes both cheating and plagiarism. Cheating includes but is not limited to (1) using or attempting to use unauthorized materials to aid in achieving a better grade on a component of a class; (2) the falsification or invention of any information, including citations, on an assigned exercise; and/or (3) helping or attempting to help another in an act of cheating or plagiarism. Plagiarism is presenting the words or ideas of another person as if they were your own. Examples of plagiarism are (1) submitting an assignment as if it were one's own work when, in fact, it is at least partly the work of another; (2) submitting a work that has been purchased or otherwise obtained from an Internet source or another source; and (3) incorporating the words or ideas of an author into one's paper without giving the author due credit.

Please read the complete policy at http://www.sfasu.edu/policies/academic_integrity.asp.

Withheld Grades Semester Grades Policy (A-54)
Ordinarily, at the discretion of the instructor of record and with the approval of the academic chair/director, a grade of WH will be assigned only if the student cannot complete the course work because of unavoidable circumstances. Students must complete the work within one calendar year from the end of the semester in which they receive a WH, or the grade automatically becomes an F. If students register for the same course in future terms the WH will automatically become an F and will be counted as a repeated course for the purpose of computing the grade point average. The circumstances precipitating the request must have occurred after the last day in which a student could withdraw from a course. Students requesting a WH must be passing the course with a minimum projected grade of C.

Students with Disabilities
To obtain disability related accommodations, alternate formats and/or auxiliary aids, students with disabilities must contact the Office of Disability Services (ODS), Human Services Building, and Room 325, 468-3004 / 468-1004 (TDD) as early as possible in the semester. Once verified, ODS will notify the course instructor and outline the accommodation and/or auxiliary aids to be provided. Failure to request services in a timely manner may delay your accommodations. For additional information, go to http://www.sfasu.edu/disabilityservices.

Acceptable Student Behavior
Classroom behavior should not interfere with the instructor’s ability to conduct the class or the ability of other students to learn from the instructional program (see the Student Conduct Code, policy D-34.1 http://www.sfasu.edu/policies/student_conduct_code.asp). Unacceptable or disruptive behavior will not be tolerated. Students who disrupt the learning environment may be asked to leave class and may be subject to judicial, academic or other penalties. This prohibition applies to all instructional forums, including electronic, classroom, labs, discussion groups, field trips, etc. The instructor shall have full discretion over what behavior is appropriate/inappropriate in the classroom. Students who do not attend class regularly or who perform poorly on class projects/exams may be referred to the Early Alert Program. This program provides students with recommendations for resources or other assistance that is available to help SFA students succeed.
## Tentative Fall 2017 Calendar

<table>
<thead>
<tr>
<th>Week</th>
<th>Date</th>
<th>Topic</th>
<th>Activity (used on this date)</th>
<th>Assignment (due on this date)</th>
<th>Section, Page and Problem Numbers (due on this date)</th>
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<tbody>
<tr>
<td>1</td>
<td>Tuesday 8/29/17</td>
<td>Course Orientation, § 1.1. The Counting Numbers</td>
<td></td>
<td>1C</td>
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<td></td>
<td>Thursday 8/31/17</td>
<td>§ 1.2. Decimals</td>
<td>1E, 1F, 1I</td>
<td>1.1: #3</td>
<td>Read CA-13 (II)</td>
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<td></td>
<td></td>
<td>§ 1.3. Reasoning to Compare Numbers in Base Ten</td>
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<td>2</td>
<td>Tuesday 9/5/17</td>
<td>§ 1.4. Reasoning about Rounding</td>
<td>1N</td>
<td>1.2: #8</td>
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<td></td>
<td></td>
<td>§ 2.1. Solving Problems and Explaining Solutions</td>
<td>1O</td>
<td>1.3: #10</td>
<td></td>
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<tr>
<td></td>
<td>Thursday 9/7/17</td>
<td>§ 2.2. Defining and Reasoning about Fractions</td>
<td>2A, 2B, 2C, 2D, 2G</td>
<td>3.1: #3</td>
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<td></td>
<td>Arithmetic Pre-Test</td>
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<td>3.2: #5</td>
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<td></td>
<td>Tuesday 9/12/17</td>
<td>§ 2.3. Reasoning about Equivalent Fractions</td>
<td>2I, 2K, 2L</td>
<td>4.1: #9</td>
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<td></td>
<td></td>
<td>§ 2.4. Reasoning to Comparing Fractions</td>
<td>2O, 2P, 2Q</td>
<td>4.2: #3</td>
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<tr>
<td></td>
<td>Thursday 9/14/17</td>
<td>Exam I - Chapters 1 and 2</td>
<td></td>
<td>4.3: #10</td>
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<td>4</td>
<td>Tuesday 9/19/17</td>
<td>§ 3.1. Interpretations of Addition and Subtraction</td>
<td>Strip Diag. 3B</td>
<td>5.1: #13</td>
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<td></td>
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<td>§ 3.2. The Commutative and Associative Properties of Addition, Mental Math, and Single-Digit Facts</td>
<td>3E, 3F, 3G</td>
<td>6.1: #12</td>
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<td></td>
<td>Thursday 9/21/17</td>
<td>§ 3.3. Why the Standard Algorithms for Addition and Subtraction in Base Ten Work</td>
<td>3I, 3J, 2,4, 3K (2,4)</td>
<td>7.1: #3</td>
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<td></td>
<td></td>
<td>§ 3.4. Reasoning About Fraction Addition and Subtraction</td>
<td>3O, 3P (3Q, 3R)</td>
<td>7.2: #3</td>
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<td></td>
<td>Tuesday 9/26/17</td>
<td>§ 4.1. Interpretations of Multiplication</td>
<td>4A, 4B, 4C</td>
<td>8.1: #3</td>
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<td></td>
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<td>§ 4.2. Why Multiplying by 10 is Special in Base Ten</td>
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<td>8.2: #3</td>
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<td></td>
<td>Thursday 9/28/17</td>
<td>§ 4.3. The Commutative and Associative Properties of Multiplication, Areas of Rectangles and Volumes of Boxes</td>
<td>4D, 4E, 4F</td>
<td>9.1: #3</td>
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<td>§ 4.4. The Distributive Property</td>
<td>4G, 4H, 4J, 4M (1,2,6)</td>
<td>10.1: #3</td>
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<td>Exam II - Chapters 3 and 4</td>
<td></td>
<td>13.1: #3</td>
<td>(4.6: #10)</td>
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<td></td>
<td>Tuesday 10/10/17</td>
<td>§ 5.1. Making Sense of Fraction Multiplication</td>
<td>5A, 5C</td>
<td>14.1: #3</td>
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<td></td>
<td></td>
<td>§ 5.1. Making Sense of Fraction Multiplication (con’t)</td>
<td>5D, 5E</td>
<td>15.1: #3</td>
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<tr>
<td>10</td>
<td>Thursday 10/12/17</td>
<td>§ 6.1. Interpretations of Division</td>
<td>6A, 6B</td>
<td>16.1: #1</td>
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<td></td>
<td>Tuesday 10/17/17</td>
<td>§ 6.2. Division and Fractions and Division with Remainder</td>
<td>6D, 6E, 6G</td>
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<td></td>
<td></td>
<td>§ 6.3. Properties of Division and Division with Remainder</td>
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<tr>
<td>Week</td>
<td>Date</td>
<td>Topic</td>
<td>Activity (due on this date)</td>
<td>Assignment (due on this date)</td>
<td>Section, Page and Problem Numbers (due on this date)</td>
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<tr>
<td>11</td>
<td>Tuesday 11/7/17</td>
<td>§ 6.3. Why Division Algorithms Work</td>
<td></td>
<td>6I</td>
<td>17</td>
</tr>
<tr>
<td></td>
<td>Thursday 11/9/17</td>
<td><em>Exam III – Chapter Sections 5.1, 6.1, 6.2 and 6.3</em></td>
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<td>18</td>
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<tr>
<td></td>
<td>Tuesday 11/14/17</td>
<td>§ 6.4. Fraction Division from the How-Many-Groups Perspective</td>
<td>6M</td>
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<tr>
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<td>Thursday 11/16/17</td>
<td>§ 6.4. Fraction Division from the How-Many-Groups Perspective (con’t)</td>
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<tr>
<td>13</td>
<td>Tuesday 11/21/17</td>
<td>Thanksgiving Holiday</td>
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<tr>
<td></td>
<td>Thursday 11/23/17</td>
<td>Thanksgiving Holiday</td>
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<tr>
<td>14</td>
<td>Tuesday 11/28/17</td>
<td>§ 6.5. Fraction Division from “How-Many-Units-in-1-Group Perspective</td>
<td>6P, 6Q</td>
<td>19</td>
<td>6.4: #7</td>
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<td></td>
<td>Thursday 11/30/17</td>
<td>§ 8.1. Factors and Multiples</td>
<td>8A, 8B, 8C 8D, 8E</td>
<td>20</td>
<td>6.5: #11</td>
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<td></td>
<td>Tuesday 12/5/17</td>
<td>§ 8.3. Divisibility Tests</td>
<td>8G, 8H, 8I, 8J</td>
<td>21</td>
<td>8.1: #6 8.2: #5</td>
</tr>
<tr>
<td></td>
<td>Thursday 12/7/17</td>
<td>§ 8.4. Prime Numbers</td>
<td>8M</td>
<td>22</td>
<td>8.4: #2</td>
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<td>15</td>
<td>Tuesday 12/12/17</td>
<td>*Final Exam - Tuesday, December 12, 2017 6:45-8:45 Kennedy Auditorium</td>
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<td>(8.5: #18, 20)</td>
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