NEW YORK CITY COLLEGE OF TECHNOLOGY
The City University of New York

DEPARTMENT: Mathematics

COURSE: MAT 1375/ MA 375

TITLE: Precalculus

DESCRIPTION: A precalculus functions course including topics from advanced algebra and the theory of equations such as solutions of polynomial equations, DeMoivre’s Theorem, Binomial Theorem, vectors, lines, conic sections and progressions. A graphing calculator is required.

Thomas W. Hungerford & Douglas J. Shaw
Brooks/Cole-Thomson Learning

CREDITS: 4

PREREQUISITES: MAT 1275/MA 275

Prepared by:
Curriculum Committee:
Prof. M. Ajoodanian
Prof. N. Benakli
Prof. H. Carley
Prof. Y. F. Celikler
Prof. S. Singh
Prof. A. P. Taraporevala (chair)
Spring 2008

A. Testing Guidelines:

The following exams should be scheduled:
1. A one-hour exam at the end of the First Quarter.
2. A one session exam at the end of the Second Quarter.
3. A one-hour exam at the end of the Third Quarter.
4. A one session Final Examination.

B. Graphing calculators are required.

Learning Outcomes
For
MAT 1375/ MA 375 Precalculus

1. Students will be able to
   • Find the distance and midpoint between two points.
   • Determine the slope, intercept, and the equation of a line.
   • Solve simple linear, quadratic and absolute value inequalities.

2. Students will be able to
   • Determine the domain, and range of a given function.
   • Find the sum, difference, product, quotient, and composition of functions.
   • Determine the roots and relative extrema of polynomials.
   • Sketch the graph of polynomial, exponential and logarithmic functions with the help of a graphing calculator.
   • Solve problems involving polynomial, exponential, and logarithmic functions.
   • Find the amplitude, phase shift, and period of trigonometric functions.

3. Students will be able to
   • Write a complex number in the rectangular and polar forms.
   • Multiply and divide two complex numbers.
   • Use DeMoivre’s Theorem to find the nth root of a complex number.
   • Find the magnitude, direction angle, horizontal, and vertical components of a vector.

4. Students will be able to identify and graph circles, parabolas, ellipses, and hyperbolas.

5. Students will be able to find
   • The nth term of arithmetic and geometric sequences.
   • The nth partial sums of arithmetic and geometric sequences.
   • Terms of a binomial expansion using the Binomial Theorem.

6. Students will be able to use a graphing calculator to assist in the above.

Mathematics Department Policy on Lateness/ Absence
A student may be absent during the semester without penalty for 10% of the class instructional sessions. Therefore,

If the class meets: The allowable absence is:

1 time per week 2 absences per semester
2 times per week 3 absences per semester

Students who have been excessively absent and failed the course at the end of the semester will receive either

- the WU grade if they have attended the course at least once. This includes students who stop attending without officially withdrawing from the course.

- the WN grade if they have never attended the course.

In credit bearing courses, the WU and WN grades count as an F in the computation of the GPA. While WU and WN grades in non-credit developmental courses do not count in the GPA, the WU grade does count toward the limit of 2 attempts for a developmental course.

The official Mathematics Department policy is that two latenesses (this includes arriving late or leaving early) is equivalent to one absence.

Every withdrawal (official or unofficial) can affect a student’s financial aid status, because withdrawal from a course will change the number of credits or equated credits that are counted toward financial aid.

New York City College of Technology Policy on Academic Integrity

Students and all others who work with information, ideas, texts, images, music, inventions, and other intellectual property owe their audience and sources accuracy and honesty in using, crediting, and citing sources. As a community of intellectual and professional workers, the College recognizes its responsibility for providing instruction in information literacy and academic integrity, offering models of good practice, and responding vigilantly and appropriately to infractions of academic integrity. Accordingly, academic dishonesty is prohibited in The City University of New York and at New York City College of Technology and is punishable by penalties, including failing grades, suspension, and expulsion. The complete text of the College policy on Academic Integrity may be found in the catalog.
<table>
<thead>
<tr>
<th>Session</th>
<th>Precalculus</th>
<th>Homework</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1.1 The Real Number System <em>(pp. 2 – 13)</em></td>
<td>P. 13: 37 - 47 all, 123 - 134 all</td>
</tr>
<tr>
<td></td>
<td>1.2A Special Topics: Absolute Value Equations <em>(pp. 32 – 33)</em></td>
<td>P. 33: 1 - 4 all</td>
</tr>
<tr>
<td>2</td>
<td>4.6A Special Topics: Absolute Value Inequalities <em>(pp. 317 – 320)</em></td>
<td>P. 320: 1 - 6 all</td>
</tr>
<tr>
<td></td>
<td>2.1 Graphs <em>(pp. 78 – 87)</em></td>
<td>P. 89: 1 - 6 all, 9, 11, 15, 16, 19, 27</td>
</tr>
<tr>
<td>3</td>
<td>2.2 Solving Equations Graphically and Numerically <em>(pp. 92 – 99)</em></td>
<td>P. 100: 7, 9, 21 - 27 odd</td>
</tr>
<tr>
<td></td>
<td>4.6 Polynomial and Rational Inequalities <em>(pp. 308 – 315)</em></td>
<td>P. 315: 2, 3 – 11 odd, 25-28 all</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Include inequalities of the form: $121 - 9x^2 \leq 0$</td>
</tr>
<tr>
<td>4</td>
<td>12.1 Sequences and Sums <em>(pp. 826 )</em> Give the definition of a sequence on</td>
<td>P. 835: 1 – 11 odd, 41 – 45 all</td>
</tr>
<tr>
<td></td>
<td>page 826 then go to section 12.2</td>
<td>P. 842: 1, 6, 7, 17, 25, 33, 37, 41, 45, 61, 63</td>
</tr>
<tr>
<td></td>
<td>12.3A Special Topics: Infinite Series <em>(pp. 852 – 856)</em></td>
<td>P. 856: 1 - 4 all, 7, 9, 10, 11, 13</td>
</tr>
<tr>
<td>6</td>
<td>1.3 The Coordinate Plane <em>(pp. 39 – 48)</em></td>
<td>P. 48: 13 – 16 all, 27, 55 - 67 odd, 71 - 77 odd</td>
</tr>
<tr>
<td>7</td>
<td>First Examination</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>1.4 Lines <em>(pp. 53 – 64)</em></td>
<td>P. 64: 2, 3, 5, 13-35 odd, 43-63 odd, 75,77</td>
</tr>
<tr>
<td>9</td>
<td>10.1 Circle and Ellipses <em>(pp. 671 – 682)</em></td>
<td>P. 683: 1 - 6 all, 7 - 13 odd, 33 - 41 odd, 45, 47</td>
</tr>
</tbody>
</table>
MAT 1375  Precalculus  


<table>
<thead>
<tr>
<th>12</th>
<th>3.1 Functions (pp. 142 – 148)</th>
<th>P. 148: 1, 3, 11-17 odd, 23-27 all, 32, 34, 42-44 all</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>3.2 Functional Notation (pp. 151 – 158)</td>
<td>P. 158: 1 - 5 odd, 13, 17, 21</td>
</tr>
<tr>
<td>13</td>
<td>3.2 Functional Notation (cont.)</td>
<td>P. 159: 27 - 31 all, 39, 41, 43 55, 57</td>
</tr>
<tr>
<td></td>
<td>3.3 Graphs of Functions (pp. 168 – 169)</td>
<td>P. 171: 12-21 all, 47, 50</td>
</tr>
<tr>
<td>14</td>
<td>3.4 Graphs and Transformations (pp. 179 – 186) (optional)</td>
<td>P. 186: 1 - 8 all, 10, 12, 15, 23, 24, 26,28</td>
</tr>
<tr>
<td></td>
<td>3.5 Operations on Functions (pp. 195 – 201)</td>
<td>P. 202: 3, 6, 11, 12-17 all, 19, 22, 25, 31-37 odd, 59</td>
</tr>
<tr>
<td>15</td>
<td>Midterm Examination</td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>4.2 Polynomial Functions (pp. 250 – 257)</td>
<td>P. 257: 11, 12, 18, 19, 23, 27, 39,41, 51, 53, 55, 56, 61</td>
</tr>
<tr>
<td></td>
<td>4.2A Special Topics: Synthetic Division (pp. 259 – 261)</td>
<td>P. 262: 3, 5, 9, 10, 13, 15</td>
</tr>
<tr>
<td>17</td>
<td>4.3 Real Roots of Polynomials (pp. 262 – 268)</td>
<td>P. 268: 1, 3, 5, 17-19 all, 23, 25, 29, 31, 34</td>
</tr>
<tr>
<td>18</td>
<td>4.4 Graphs of Polynomial Functions (pp. 270 – 278)</td>
<td>P. 278: 1 - 12 all, 19 – 24 all, 25, 29, 31, 43, 45</td>
</tr>
<tr>
<td></td>
<td>4.8 Theory of Equations (pp. 328 - 332)</td>
<td>P. 332: 1, 3, 13, 17, 19, 21, 25, 26, 29, 30, 31, 45, 47</td>
</tr>
<tr>
<td>19</td>
<td>5.2 Exponential Functions (pp. 357 – 365)</td>
<td>P. 365: 1 - 5 all, 49, 51, 64, 67, 71, 72, 74</td>
</tr>
<tr>
<td>20</td>
<td>5.2A Special Topics: Compound Interest and the Number e (pp. 369 – 373)</td>
<td>P. 374: 3-9 odd, 11, 19, 23, 27, 28</td>
</tr>
<tr>
<td>21</td>
<td>5.3 Common and Natural Logarithmic Functions (pp. 375 - 382)</td>
<td>P. 383: 5, 9, 11, 15, 19, 23, 43, 45 57, 59, 77, 79</td>
</tr>
<tr>
<td></td>
<td>5.4 Properties of Logarithms (pp. 385 – 390)</td>
<td>P. 390: 1 - 19 odd</td>
</tr>
<tr>
<td>22</td>
<td>5.5 Algebraic Solutions of Exponential and Logarithmic Equations (pp. 399 – 406)</td>
<td>P. 406: 1, 7 - 11 odd, 17, 19, 53 , 56</td>
</tr>
<tr>
<td>Page</td>
<td>Section</td>
<td>Topics</td>
</tr>
<tr>
<td>------</td>
<td>---------</td>
<td>--------</td>
</tr>
<tr>
<td>23</td>
<td><strong>Third Examination</strong></td>
<td></td>
</tr>
<tr>
<td>24</td>
<td><strong>6.4</strong></td>
<td>Basic Graphs (pp. 466 – 474) (optional)</td>
</tr>
<tr>
<td></td>
<td><strong>6.5</strong></td>
<td>Periodic Graphs and Simple Harmonic Motion (pp. 477– 486)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>P. 474: 11 - 21 odd</td>
</tr>
<tr>
<td></td>
<td></td>
<td>P. 486: In these problems modify the instructions to require that the graphs are plotted over one period:1, 2, 5, 6, 27, 28, 31, 32: Optional Problems: 15, 18, 23, 26</td>
</tr>
<tr>
<td>25</td>
<td><strong>7.4</strong></td>
<td>Inverse Trigonometric Functions (pp. 545 – 553)</td>
</tr>
<tr>
<td></td>
<td><strong>9.1</strong></td>
<td>The Complex Plane and Polar Form of Complex Numbers (pp. 626 – 630)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>P. 553: 1 - 17 odd</td>
</tr>
<tr>
<td></td>
<td></td>
<td>P. 630: 1-5 odd, 9, 13, 25, 27, 37-45 odd, 53, 55, 59, 61</td>
</tr>
<tr>
<td>26</td>
<td><strong>9.2</strong></td>
<td>DeMoivre’s Theorem and $n$th Roots of Complex Numbers (pp. 632 – 638)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>P. 638: 1, 3, 13, 15, 19, 20, 23, 33, 41</td>
</tr>
<tr>
<td>27</td>
<td><strong>9.3</strong></td>
<td>Vectors in the Plane (pp. 639 – 650)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>P. 651: 5, 11, 15, 17, 21,27-49 odd</td>
</tr>
<tr>
<td>28</td>
<td><strong>12.4</strong></td>
<td>The Binomial Theorem (pp. 857 – 862)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>P. 862: 3, 4, 7, 23, 24, 27, 37, 49, 51</td>
</tr>
<tr>
<td>29</td>
<td>Final Examination Review</td>
<td></td>
</tr>
<tr>
<td>30</td>
<td>Final Examination</td>
<td></td>
</tr>
<tr>
<td>Precalculus</td>
<td>Homework</td>
<td></td>
</tr>
<tr>
<td>------------------------------------------------</td>
<td>-----------------------------------------------</td>
<td></td>
</tr>
<tr>
<td>1.1 The Real Number System</td>
<td>P. 13: 37 - 47 all, 123 - 134 all</td>
<td></td>
</tr>
<tr>
<td>1.2A <em>Special Topics</em>: Absolute Value Equations</td>
<td>P. 33: 1 - 4 all</td>
<td></td>
</tr>
<tr>
<td>4.6A <em>Special Topics</em>: Absolute Value Inequalities</td>
<td>P. 320: 1 - 6 all</td>
<td></td>
</tr>
<tr>
<td>2.1 Graphs</td>
<td>P. 89: 1 - 6 all, 9, 11, 15, 16, 19, 27</td>
<td></td>
</tr>
<tr>
<td>2.2 Solving Equations Graphically and Numerically</td>
<td>P. 100: 7, 9, 21 - 27 odd</td>
<td></td>
</tr>
<tr>
<td>4.6 Polynomial and Rational Inequalities</td>
<td>P. 315: 2, 3 – 11 odd, 25-28 all, Include inequalities of the form: $121 - 9x^2 \leq 0$</td>
<td></td>
</tr>
<tr>
<td>12.1 Sequences and Sums</td>
<td>P. 835: 1 – 11 odd, 41 – 45 all</td>
<td></td>
</tr>
<tr>
<td>12.2 Arithmetic Sequences</td>
<td>P. 842: 1, 6, 7, 17, 25, 33, 37, 41, 45, 61, 63</td>
<td></td>
</tr>
<tr>
<td>12.3 Geometric Sequences</td>
<td>P. 850: 1 - 7 odd, 13, 15, 23, 33, 39-47 odd</td>
<td></td>
</tr>
<tr>
<td>12.3A <em>Special Topics</em>: Infinite Series</td>
<td>P. 856: 1 - 4 all, 7, 9, 10, 11, 13</td>
<td></td>
</tr>
<tr>
<td>1.3 The Coordinate Plane</td>
<td>P. 48: 13 – 16 all, 27, 55 - 67 odd, 71 - 77 odd</td>
<td></td>
</tr>
<tr>
<td>1.4 Lines</td>
<td>P. 64: 2, 3, 5, 13-35 odd, 43-63 odd, 75,77</td>
<td></td>
</tr>
<tr>
<td>10.1 Circle and Ellipses</td>
<td>P. 683: 1 - 6 all, 7 - 13 odd, 33 - 41 odd, 45, 47</td>
<td></td>
</tr>
<tr>
<td>10.2 Hyperbolas</td>
<td>P. 697: 1 - 6 all, 11, 13, 15, 17, 25-31 odd</td>
<td></td>
</tr>
<tr>
<td>10.3 Parabolas</td>
<td>P. 710: 1 - 6 all, 17 - 25 odd, 35-39 odd, 55 - 61 odd</td>
<td></td>
</tr>
<tr>
<td>3.1 Functions</td>
<td>P. 148: 1, 3, 11-17 odd, 23-27 all, 32, 34, 42-44 all</td>
<td></td>
</tr>
<tr>
<td>Section</td>
<td>Topic</td>
<td>Page</td>
</tr>
<tr>
<td>---------</td>
<td>-------</td>
<td>------</td>
</tr>
<tr>
<td>3.2</td>
<td>3.3</td>
<td>3.4</td>
</tr>
<tr>
<td>3.2</td>
<td>Functional Notation</td>
<td>P. 158</td>
</tr>
<tr>
<td>3.3</td>
<td>Graphs of Functions</td>
<td>P. 171</td>
</tr>
<tr>
<td>3.4</td>
<td>Graphs and Transformations</td>
<td>P. 186</td>
</tr>
<tr>
<td>3.5</td>
<td>Operations on Functions</td>
<td>P. 202</td>
</tr>
<tr>
<td>4.2</td>
<td>Polynomial Functions</td>
<td>P. 257</td>
</tr>
<tr>
<td>4.2A</td>
<td>Special Topics: Synthetic Division</td>
<td>P. 262</td>
</tr>
<tr>
<td>4.3</td>
<td>Real Roots of Polynomials</td>
<td>P. 268</td>
</tr>
<tr>
<td>4.4</td>
<td>Graphs of Polynomial Functions</td>
<td>P. 278</td>
</tr>
<tr>
<td>4.8</td>
<td>Theory of Equations</td>
<td>P. 332</td>
</tr>
<tr>
<td>5.2</td>
<td>Exponential Functions</td>
<td>P. 365</td>
</tr>
<tr>
<td>5.2A</td>
<td>Special Topics: Compound Interest and the Number e</td>
<td>P. 374</td>
</tr>
<tr>
<td>5.3</td>
<td>Common and Natural Logarithmic Functions</td>
<td>P. 383</td>
</tr>
<tr>
<td>5.4</td>
<td>Properties of Logarithms</td>
<td>P. 390</td>
</tr>
<tr>
<td>5.5</td>
<td>Algebraic Solutions of Exponential and Logarithmic Equations</td>
<td>P. 406</td>
</tr>
<tr>
<td>6.4</td>
<td>Basic Graphs</td>
<td>P. 474</td>
</tr>
<tr>
<td>6.5</td>
<td>Periodic Graphs and Simple Harmonic Motion</td>
<td>P. 486</td>
</tr>
<tr>
<td>7.4</td>
<td>Inverse Trigonometric Functions</td>
<td>P. 553</td>
</tr>
</tbody>
</table>
### MAT 1375 Precalculus


<table>
<thead>
<tr>
<th>Section</th>
<th>Topic</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>9.1</td>
<td>The Complex Plane and Polar Form of Complex Numbers</td>
<td>P. 630: 1-5 odd, 9, 13, 25, 27, 37-45 odd, 53, 55, 59, 61</td>
</tr>
<tr>
<td>9.2</td>
<td>DeMoivre’s Theorem and $n$th Roots of Complex Numbers</td>
<td>P. 638: 1, 3, 13, 15, 19, 20, 23, 33, 41</td>
</tr>
<tr>
<td>9.3</td>
<td>Vectors in the Plane</td>
<td>P. 651: 5, 11, 15, 17, 21, 27-49 odd</td>
</tr>
<tr>
<td>12.4</td>
<td>The Binomial Theorem</td>
<td>P. 862: 3, 4, 7, 23, 24, 27, 37, 49, 51</td>
</tr>
</tbody>
</table>