

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

**DEPARTMENT:** Mathematics

**COURSE:** MAT 1375

**TITLE:** Precalculus

**DESCRIPTION:** Topics include an in-depth study of functions such as polynomial functions, radical functions, rational functions, trigonometric functions, exponential and logarithmic functions; connections to vectors and complex numbers; solving trigonometric equations, and identities involving sum, double and half-angle formulas; Binomial Theorem and progressions.

**TEXTS:** Precalculus  
Second Edition  
By Thomas Tradler and Holly Carley  
Available on [www.lulu.com](http://www.lulu.com)  
PDF available from:  
[websupport1.citytech.cuny.edu/faculty/ttradler/precalculus.html](http://websupport1.citytech.cuny.edu/faculty/ttradler/precalculus.html)

**CREDITS:** 4

**PREREQUISITES:** MAT 1275

Prepared by Professor Thomas Tradler  
(Spring 2013)

- 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.

## Course Intended Learning Outcomes/Assessment Methods

Learning Outcomes	Assessment Methods
<b>1.</b> <ul style="list-style-type: none"> <li>• Solve absolute value equations algebraically.</li> <li>• Solve equations graphically.</li> </ul>	Classroom activities and discussion, homework, exams.
<b>2.</b> <ul style="list-style-type: none"> <li>• Determine the domain, and range of a given function.</li> <li>• Find the sum, difference, product, quotient, and composition of functions.</li> <li>• Determine the effects of basic operations on graphs of functions.</li> <li>• Determine the inverse of a function, if it exists.</li> <li>• Determine the roots and relative extrema of polynomials.</li> <li>• Sketch the graphs of polynomial, rational, exponential, and logarithmic functions.</li> <li>• Solve equations involving polynomial, rational, exponential, and logarithmic functions.</li> <li>• Solve polynomial, rational and absolute value inequalities.</li> </ul>	Classroom activities and discussion, homework, exams.
<b>3.</b> <ul style="list-style-type: none"> <li>• Find the amplitude, phase shift, and period of trigonometric functions.</li> <li>• Use the trigonometric identities, half- and double-angle formulas to modify trigonometric formulas.</li> <li>• Solve trigonometric equations</li> </ul>	Classroom activities and discussion, homework, exams.
<b>4.</b> <ul style="list-style-type: none"> <li>• Write a complex number in rectangular and polar forms.</li> <li>• Multiply and divide two complex numbers in polar form.</li> <li>• Find the magnitude, direction angle, horizontal, and vertical components of a vector.</li> </ul>	Classroom activities and discussion, homework, exams.
<b>5. Find</b> <ul style="list-style-type: none"> <li>• The n-th term of arithmetic and geometric sequences.</li> <li>• The n-th partial sums of arithmetic and geometric sequences.</li> <li>• Terms of a binomial expansion using the Binomial Theorem.</li> </ul>	Classroom activities and discussion, homework, exams.
<b>6. Use a graphing calculator to assist in the above.</b>	Classroom activities and discussion, homework, exams.

## **General Education Learning Outcomes/Assessment Methods**

<b>Learning Outcomes</b>	<b>Assessment Methods</b>
<b>1.</b> Understand and employ both quantitative and qualitative analysis to solve problems.	Classroom activities and discussion, homework, exams.
<b>2.</b> Employ scientific reasoning and logical thinking.	Classroom activities and discussion, homework, exams.
<b>3.</b> Communicate effectively using written and oral means.	Classroom activities and discussion, homework, exams.
<b>4.</b> Use creativity to solve problems.	Classroom activities and discussion, homework, exams.

### **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.

**MAT 1375 – Precalculus**

**Text:** “*Precalculus*” Thomas Tradler and Holly Carley, Second Edition, available on [www.lulu.com](http://www.lulu.com)  
 PDF available from: <http://websupport1.citytech.cuny.edu/faculty/ttradler/precalculus.html>

<b>Session</b>	<b>Topic</b>	<b>Homework</b>
1	1. The absolute value	Exercises 1.1, 1.2, 1.3 (a)-(e), 1.4 (a)-(f), 1.6, 1.7 (a)-(f)
2	2. Lines and functions	Exercises 2.1 (a)-(c), 2.3 (a)-(c), 2.5-2.8 all
3	3. Functions by formulas and graphs	Exercises 3.1 (a)-(b), 3.2, 3.4 (a)-(f), 3.6 (a)-(f), 3.7 (a)-(g) and (m)-(t), 3.8, 3.9
4	4. Introduction to the TI-84	Exercise 4.1, 4.2 (a), 4.3 (c)-(i), 4.6
5	5. Basic functions and transformations	Exercise 5.1, 5.2 (a)-(f), 5.3 (a)-(d), 5.5 (a)-(e)
6	6. Operations on functions	Exercise 6.1 (a)-(c), 6.2 (a)-(b), 6.3 (a)-(d), 6.4 (a)-(c), 6.5 (a)-(b), 6.6, 6.7
7	7. The inverse of a function	Exercise 7.1 (a)-(c), 7.2 (a)-(f) and (l)-(p), 7.3 (a)-(c), 7.4 (a)-(c), 7.5 (a) and (d)
8	<b>First Examination</b>	
9	8. Dividing polynomials (8.3 Synthetic division <i>is optional</i> )	Exercise 8.1 (a)-(c) and (j)-(k), 8.2, 8.3, 8.4 (a)-(d) ( <i>Optional</i> : 8.5 (a)-(d))
10	9. Graphing polynomials (9.3 Graphing polynomials by hand <i>is optional</i> )	Exercise 9.1-9.3 all, 9.4 (a)-(c), 9.5 (a)-(c) ( <i>Optional</i> : 9.6)
11	10. Roots of polynomials  (10.1 Rational root theorem <i>is optional</i> )	Exercise 10.2 (a)-(d), 10.3 (a)-(c), 10.4 (a)-(c) and (f)-(h), 10.5 (a)-(c) and (f)-(i) ( <i>Optional</i> : 10.1)
12	11. Rational functions (11.2 Graphing rational functions by hand <i>is optional</i> )	Exercise 11.1-11.4 all
13	12. Polynomial and rational inequalities	Exercise 12.1 (a)-(c), 12.2 (g)-(j), 12.4 (a)-(f), 12.5
14	13. Exponential and logarithmic functions	Exercise 13.1 (a)-(f), 13.2 (a)-(e), 13.4, 13.5 (a)-(b), 13.6 (a)-(h)
15	<b>Midterm Examination</b>	
16	14. Properties of exp and log	Exercise 14.1 (a)-(e), 14.2 (a)-(f), 14.3 (a)-(c) and (e), 14.4 (e)-(g), 14.5 (a)-(e)
17	15. Applications of exp and log	Exercise 15.1 (a)-(b), 15.3-15.8 all
18	16. Half-life and compound interest	Exercise 16.1-16.7 all, 16.9 (a)-(c), 16.10 (a)-(e)

19	17. Trigonometric functions	Exercise 17.1 (a)-(d) and (g)-(h), 17.3, 17.4, 17.5 (a)-(d), 17.6 (a)-(g)
20	18. Addition of angles and multiple angle formulas	Exercise 18.1 (a)-(e), 18.2 (a)-(b), 18.3 (a)-(d), 18.4 (a)-(d)
21	19. Inverse trigonometric functions	Exercise 19.1, 19.2 (a)-(j), 19.3 (a)-(c) and (g)-(i)
22	20. Trigonometric equations	Exercise 20.1 (a)-(f), 20.2 (b)-(c), 20.4 (a)-(k), 20.5 (a)
23	<b>Third Examination</b>	
24	21. Complex numbers	Exercise 21.1 (a)-(c), 21.2 (b)-(e), 21.3 (a)-(c), 21.4 (a)-(d), 21.5 (c)-(d), 21.6 (a)-(d), 21.7 (a)-(d)
25	22. Vectors in the plane	Exercise 22.1 (a) and (d), 22.2 (a)-(d), 22.3 (b)-(f) and (k)-(m), 22.4 (a)-(b)
26	23. Sequences and series	Exercise 23.1 (a)-(c), 23.3 (a)-(d), 23.4 (a)-(d), 23.5 (a)-(b), 23.7 (a)-(b) and (e)-(i)
27	24. The geometric series	Exercise 24.1 (a)-(d), 24.2 (a)-(c), 24.3 (a)-(b) and (e)-(i), 24.4 (c) and (f)-(i), 24.5 (a)
28	25. The binomial theorem	Exercise 25.1 (a) and (i)-(l), 25.2 (b), 25.3 (a)-(d), 25.4 (a)-(d), 25.5 (a)-(d), 25.6 (a)-(d)
29	<b>Review</b>	
30	<b>Final Examination</b>	

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<b>Topic</b>	<b>Homework</b>
1. The absolute value	Exercises 1.1, 1.2, 1.3 (a)-(e), 1.4 (a)-(f), 1.6, 1.7 (a)-(f)
2. Lines and functions	Exercises 2.1 (a)-(c), 2.3 (a)-(c), 2.5-2.8 all
3. Functions by formulas and graphs	Exercises 3.1 (a)-(b), 3.2, 3.4 (a)-(f), 3.6 (a)-(f), 3.7 (a)-(g) and (m)-(t), 3.8, 3.9
4. Introduction to the TI-84	Exercise 4.1, 4.2 (a), 4.3 (c)-(i), 4.6
5. Basic functions and transformations	Exercise 5.1, 5.2 (a)-(f), 5.3 (a)-(d), 5.5 (a)-(e)
6. Operations on functions	Exercise 6.1 (a)-(c), 6.2 (a)-(b), 6.3 (a)-(d), 6.4 (a)-(c), 6.5 (a)-(b), 6.6, 6.7
7. The inverse of a function	Exercise 7.1 (a)-(c), 7.2 (a)-(f) and (l)-(p), 7.3 (a)-(c), 7.4 (a)-(c), 7.5 (a) and (d)
8. Dividing polynomials (8.3 Synthetic division <i>is optional</i> )	Exercise 8.1 (a)-(c) and (j)-(k), 8.2, 8.3, 8.4 (a)-(d) ( <i>Optional</i> : 8.5 (a)-(d))
9. Graphing polynomials (9.3 Graphing polynomials by hand <i>is optional</i> )	Exercise 9.1-9.3 all, 9.4 (a)-(c), 9.5 (a)-(c) ( <i>Optional</i> : 9.6)
10. Roots of polynomials (10.1 Rational root theorem <i>is optional</i> )	Exercise 10.2 (a)-(d), 10.3 (a)-(c), 10.4 (a)-(c) and (f)-(h), 10.5 (a)-(c) and (f)-(i) ( <i>Optional</i> : 10.1)
11. Rational functions (11.2 Graphing rational functions by hand <i>is optional</i> )	Exercise 11.1-11.4 all
12. Polynomial and rational inequalities	Exercise 12.1 (a)-(c), 12.2 (g)-(j), 12.4 (a)-(f), 12.5
13. Exponential and logarithmic functions	Exercise 13.1 (a)-(f), 13.2 (a)-(e), 13.4, 13.5 (a)-(b), 13.6 (a)-(h)
14. Properties of exp and log	Exercise 14.1 (a)-(e), 14.2 (a)-(f), 14.3 (a)-(c) and (e), 14.4 (e)-(g), 14.5 (a)-(e)
15. Applications of exp and log	Exercise 15.1 (a)-(b), 15.3-15.8 all
16. Half-life and compound interest	Exercise 16.1-16.7 all, 16.9 (a)-(c), 16.10 (a)-(e)
17. Trigonometric functions	Exercise 17.1 (a)-(d) and (g)-(h), 17.3, 17.4, 17.5 (a)-(d), 17.6 (a)-(g)

18. Addition of angles and multiple angle formulas	Exercise 18.1 (a)-(e), 18.2 (a)-(b), 18.3 (a)-(d), 18.4 (a)-(d)
19. Inverse trigonometric functions	Exercise 19.1, 19.2 (a)-(j), 19.3 (a)-(c) and (g)-(i)
20. Trigonometric equations	Exercise 20.1 (a)-(d), 20.2 (a)-(b), 20.4 (a)-(k), 20.5 (a)
21. Complex numbers	Exercise 21.1 (a)-(c), 21.2 (b)-(e), 21.3 (a)-(c), 21.4 (a)-(d), 21.5 (c)-(d), 21.6 (a)-(d), 21.7 (a)-(d)
22. Vectors in the plane	Exercise 22.1 (a) and (d), 22.2 (a)-(d), 22.3 (b)-(f) and (k)-(m), 22.4 (a)-(b)
23. Sequences and series	Exercise 23.1 (a)-(c), 23.3 (a)-(d), 23.4 (a)-(d), 23.5 (a)-(b), 23.7 (a)-(b) and (e)-(i)
24. The geometric series	Exercise 24.1 (a)-(d), 24.2 (a)-(c), 24.3 (a)-(b) and (e)-(i), 24.4 (c) and (f)-(i), 24.5 (a)
25. The binomial theorem	Exercise 25.1 (a) and (i)-(l), 25.2 (b), 25.3 (a)-(d), 25.4 (a)-(d), 25.5 (a)-(d), 25.6 (a)-(d)