Math 105 Precalc

- Download Syllabus
- Syllabus on next pages
- use 6th edition textbook
  - only need code
    - Instructions on Canvas
    - You might need to disable popups
- grade should be linked to Canvas
- Usually 1 assignment per week
- Doesn't take attendance
- groupwork will be used as attendance
- Take math 98 for help
  - if You Pass Math 98 You get 2% extra credit
  - if you can't take Math 98, email professor
    for extra credit Project
- University Policy: You need to wear a mask

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MATH 105 PRE-CALCULUS

Fall 2022

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Instructor: Phuoc L. Ho
Office: BTE 2844
Office Hours: MW 3:00-3:50pm, Th 12:00-1:50pm, or by appointment
Email: phuoc.ho@csuci.edu

Class time: Math 105-02 MW 4:00-5:50pm Bell Tower 2424
Math 105-03 TuTh 10:00-11:50am Bell Tower 2424

Course Website: Canvas

Course description: Topics include: number systems and their algebraic properties; systems of equations and inequalities; basic analytic geometry of lines and conic sections; elementary functions including polynomial, rational, exponential, and logarithmic, with emphasis on trigonometric functions, fundamental theorem of algebra and theory of equations; polar equations and curves.

Prerequisite: A passing score on the Entry Level Mathematics Examination.

Learning Outcomes: Through this course, students will be able to
- Improve their advanced algebraic and mathematical thinking skills.
- Apply methods of analytic geometry and trigonometry.
- Apply algebraic skills and computer software to problem solving.
- Apply various functions and their graphs to problem solving.
- Organize and express ideas clearly and convincingly in oral and written forms.

Textbook: Access code for Blitzer's textbook. ISBN 978-013-475-3638
Optional: Precalculus 6th edition by Blitzer.
Optional: Softcover textbook and access code.
Note that this course requires the use of an online software called MyMathLab. Therefore, you will need the access code for all online assignments and online tests.

Exams: There will be one midterm and one final.
Midterm, Wednesday Oct 5 (section 2); Thursday Oct 6 (section 3)
Final, Monday December 5 from 4:00-6:00pm (section 2)
Thursday December 8 from 8:00-10:00am (section 3)
Students are required to give their instructor one week notice, in writing, of any conflict of an exam.

Attendance: All registered students are expected to attend and participate actively in class.

Grading: Homework 25%, Midterm 25%, Final 25%, Group Activities 7%, Online Tests 20%
$A > 90\%$, $B > 80\%$, $C > 70\%$, $D > 60\%$, $F < 60\%$

Math 98: This course is designed for students in placement categories III or IV and for students who are looking for stronger algebra and trigonometry skills. This class is a credit, or no credit grading. All topics for this course as well as homework assignments are linked with Math 105 Pre-Calculus course.

I strongly encourage you to register for the Math 98 course. The material will follow our course schedule, and it will definitely help you succeed in Math 105. If you complete the Math 98 course successfully, you will receive an additional 2% toward your overall score in Math 105. If you cannot take the Math 98 course, but you want to get the extra 2% credit, please, email me, and I will give you a project to complete.

Calculator: Graphing calculators such as TI-83 and TI-84 are recommended. You will be allowed to use a calculator on a certain (but not all) in-class examinations.

In Case of Disruption: A disruption means you, me, or all of us cannot participate in 'class as usual' for a reason we could not predict at the beginning of the semester. If I am out, I will give instructions via email and Canvas Announcements. If you are out, please email me as soon as possible and prepare to catch up with the class. If campus closes, we will change to online synchronous learning.

COVID Mandates: CSUCI is following guidelines from the California Department of Public Health and Ventura County Department of Public Health to promote safety during the COVID-19 pandemic for CSUCI students, employees, and visitors on the campus, to help prevent and protect oneself and others from the spread of the virus. Students are required to adhere to all health and safety requirements outlined on the University's website regarding COVID-19. Failure to do so may result in removal from the classroom and, in keeping with CSU policy, the student may also be denied access to campus/programs.

Additional Resources:
Learning Resource Center (BRO 2760)

Academic Honesty: Cheating will not be tolerated in this class. See University Catalog for Policy on Academic Dishonesty.

Disability Statement: Cal State Channel Islands is committed to equal educational opportunities for qualified students with disabilities in compliance with Section 504 of the Federal Rehabilitation Act of 1973 and the

Americans with Disabilities Act (ADA) of 1990. The mission of Disability Accommodation Services is to assist students with disabilities to realize their academic and personal potential. Students with physical, learning, or other disabilities are encouraged to contact the Disability Resource Programs at Bell Tower 1541. Email- accommodations@csuci.edu, phone- (805) 437-3331, for personal assistance and accommodations. Online assistance and services are available from https://www.csuci.edu/dass/.

Disclaimer: Information contained within this syllabus, other than that mandated by the University, may be subject to change with advance notice, as deemed appropriate by the instructor.

Precalc	Just the class before Calculus Algebra + Trigenometry first half of Semester is algebra second half of Semester is trig. trig is <u>hard</u>
Algebra §§ P1 – P6	
§ P.5 Factoring Polynomials	
<u>Def</u> monomial	The expression ax^n is called a monomial, where a is real, x is a variable, and n is a nonnegative integer eg. $2x^5$
real number	any rational or irrational numbers
degree	if $a \neq 0$ the degree of ax^n is n eg. degree of $2x^5$ is 5

| example | is 3 a monomial?
Yes, because $3 = 3 \cdot x^0$
3 is a monomial of degree 0

The degree of monomial 0 is?

$0 = 0 \cdot x^0 = 0 \cdot x^{100}$ undefined |

| Def
Polynomial | A **Polynomial** is a finite sum of monomials.

The degree of a Polynomial is the greatest degree of all the monomials (term)

e.g. $x^2 + \sqrt{2}$ is a **binomial** with deg $= 2$
e.g. $7x^5 - 3x^3 + 6$ **trinomial** has a degree of 5
e.g. $6x^3 + 4x^2 - x + 3$ **Polynomial** w/ deg $= 3$

In general, a Polynomial in x is an expression of the form

$$P(x) = a_n x^n + a_{n-1} x^{n-1} + \cdots + a_1 x + a_0, \quad a_n \neq 0$$

The degree of $P(x)$, deg(P), is n

$a_n x^n$ is the leading term
a_0 is the constant term
a_n is the leading coefficient |

EX

$$P(x) = 2x^2 - 3x^4 + \frac{1}{2}x - 5$$

$\text{Deg}(P) = 4$
leading term $= -3x^4$
leading coeff $= -3$
constant term $= -5$

Factoring

1. **Greatest common factor (GCF)**
   or Greatest common divisor (GCD)

expand $x(x+2) = x^2 + 2x$ dist. law
factor $x^2 + 2x = x(x+2)$
   The GCD of x^2 and $2x$ is x

EX

factor $5x^5 - 10x^3$
   GCD $= 5x^3$
   $5x^3(x^2 - 2)$

EX

$2xy^2 + 10x^2y - 6xy$ trinomial in 2 variables
         GCD $= 2xy$
$= 2xy(y + 5x - 3)$

EX

$5x(x-y) + 2y(x-y)$
         GCD $= x-y$
$= (x-y)(5x+2y)$

2. **factor by grouping**
   (usually when we have 4 terms)

   factor in smaller groups

EX

Factor $x^3 + 4x^2 + 3x + 12$

$= (x^3 + 4x^2) + (3x + 12)$

$= 4x^2(x+4) + 3(x+4)$

$= (4x^2 + 3)(x+4)$

EX

$2x^3y + x^2 + 2xy^2 + y$

$= (2x^3y + 2xy^2) + (x^2 + y)$

$= 2xy(x^2 + y) + (x^2 + y)$

$= (2xy + 1)(x^2 + y)$

Try

$2x - 4x^2y - 3y + 6xy^2$

$= (2x - 3y) + (-4x^2y + 6xy^2)$

$= (2x - 3y) - 2xy(2x - 3y)$

$= (1 - 2xy)(2x - 3y)$

3. factoring trinomials

expand $\quad (x+2)(x+3) = x^2 + 5x + 6 \qquad$ Dist, FOIL

factor $\quad x^2 + 5x + 6 = (x+2)(x+3)$

EX

2 Xs

factor $x^2 - 5x + 6$

$= (x - 2)(x - 3)$

$$\begin{array}{c|c} \multicolumn{2}{c}{6} \\ \hline 1 & 6 \\ -1 & -6 \\ 2 & 3 \\ -2 & -3 \end{array}$$

Product = 6
Sum = -5

EX

factor $x^2 + 2x - 15$

$= (x - 3)(x - 5)$

$$\begin{array}{c|c} \multicolumn{2}{c}{-15} \\ \hline -1 & 15 \\ 1 & -15 \\ 3 & -5 \\ -3 & 5 \end{array}$$

Product = -15
Sum = 2

EX

factor $x^2 - x + 2$

irriducable/prime

$$\frac{2}{1|2}$$
$$-1|-2$$

Prod $= 2$
Sum $= -1$

irreducable
(Prime)

Polynomial that cannot be factored

EX

factor $2x^2 + 5x - 3$
$= (2x - 1)(x + 3)$

$$\frac{-3}{1|-3}$$
$$-1|3$$

Prod $= -3$

X $(2x+1)(x-3)$
X $(2x-3)(x+1)$
✓ $(2x-1)(x+3)$
X $(2x+3)(x-1)$

4. Special formulas
  (i) $A^2 - B^2 = (A+B)(A-B)$ diff of 2 squares
  (ii) $A^2 + 2AB + B^2 = (A+B)^2$ } Perfect square
  (iii) $A^2 - 2AB + B^2 = (A-B)^2$ } trinomials
  (iv) $A^3 + B^3 = (A+B)(A^2 - AB + B^2)$ sum of 2 cubes
  (v) $A^3 - B^3 = (A-B)(A^2 + AB + B^2)$ diff of 2 cubes

EX

factor $9 - 16x^2$
$= 3^2 - (4x)^2$ $A^2 - B^2$
$= (3 + 4x)(3 - 4x)$ $(A+B)(A-B)$

EX

$8x^3 + 1$
$= (2x)^3 + 1^3$ $A^3 + B^3$
$= (2x+1)((2x)^2 - 2x + 1^2)$ $(A+B)(A^2 - AB + B^2)$
$= (2x+1)(4x^2 - 2x + 1)$

$\underline{EX}$

$$\frac{1}{8}u^3 + 8v^3$$
$$= \left(\frac{1}{2}u\right)^3 + (2v)^3 \qquad \textcolor{red}{Sum\ of\ 2\ cubes}$$

$\underline{EX}$

factor $2x(x+2) + 3(x+2)(x^2-4)$
$$= (x+2)(2x + 3(x^2-4))$$
$$= (x+2)(3x^2 + 2x - 12)$$

$\underbrace{\qquad\qquad}_{\textcolor{blue}{irreducable}}$

$\textcolor{red}{Prod = 12}$

$$\begin{array}{c|c} \multicolumn{2}{c}{12} \\ \hline 1 & 12 \\ 2 & 6 \\ 3 & 4 \end{array}$$

§ P.6

Rational expressions.

$\underline{Def}$ A Rational expression (function) is an expression of the form $\frac{P(x)}{q(x)}$ where $P(x)$ and $q(x)$ are Polynomials and $q(x) \neq 0$

e.g $\frac{2x+}{x-5}$, $\frac{1}{x^2+1}$, $\frac{x^3-x}{3}$

we exclude numbers from a rat. expressions domain that make the denom 0

e.g $\frac{2x+1}{x-5}$, $x \neq 5$

EX $\quad \dfrac{1}{x^2+x}$, $x \neq 0$, $x \neq -1$

$\quad \large\downarrow \normalsize \dfrac{1}{x(x+1)}$

or solve

$\quad x^2 + x = 0$

$\quad x(x+1) = 0$

$\quad \boxed{x = 0 \text{ or } x = -1}$

EX $\quad$ Simplify $\quad \dfrac{x^2 - x - 6}{3x - x^2}$

$\quad \dfrac{(x-3)(x+2)}{x(3-x)}$, $x \neq 0$, $x \neq 3$

$\quad = \dfrac{(x-3)(x+2)}{-x(x-3)} = -\dfrac{x+2}{x}$