

Math 1050 CBE 1 Review

UtahStateUniversity®

CBE 1

Covers lessons 1-6

Intro to
Complex
Numbers

Solving
Equations

Intro to
Functions

Function
Notation

Graphs of
Functions

Graphs of
Common
Functions

Problem 1

- Perform the indicated operations and write the complex number in the standard form $a + bi$.

$$-2i + \frac{-5 + i}{4 - i}$$

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Solution: $\frac{-21}{17} - \frac{35i}{17}$

Complex Numbers

Standard Form	Addition	Subtraction
$a + bi$ a and b are real numbers $i^2 = -1$	Combine like terms Example: $(3 + 2i) + (1 - 5i)$ $= 4 - 3i$	Combine like terms Example: $(2 + 4i) - (3 - i)$ $= 5i - 1$

Complex Numbers

Conjugate	Multiplication	Division
Same expression, opposite sign on i Example: $2 - i \longrightarrow 2 + i$	1. Distribute 2. Simplify Example: $(4 + i)(1 - 3i)$ $= 7 - 11i$	1. Multiply by conjugate 2. Distribute 3. Simplify Example: $\frac{3 + 2i}{1 - 5i} = -\frac{7}{26} + \frac{17i}{26}$

Problem 2

True or False: The imaginary number $-\sqrt{6}i$ is a solution to the equation $x^4 - 36 = 0$.

Solution: True

Problem 3

- Determine all the real number solutions to the rational equation

$$\frac{15}{x+1} = 5$$

Solution: $x = 2$

Problem 4

- Determine all the complex solutions to the equation

$$(x + 2)(x + 4) = 5$$

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$$\text{Solution: } \frac{-6 \pm \sqrt{24}}{2}$$

What do You Know if Two Things Multiply to Zero?

$$a \cdot b = 0$$

Either a or b must be equal to zero for this equation to be true.

- This is called the Zero Product Property!

Problem 5

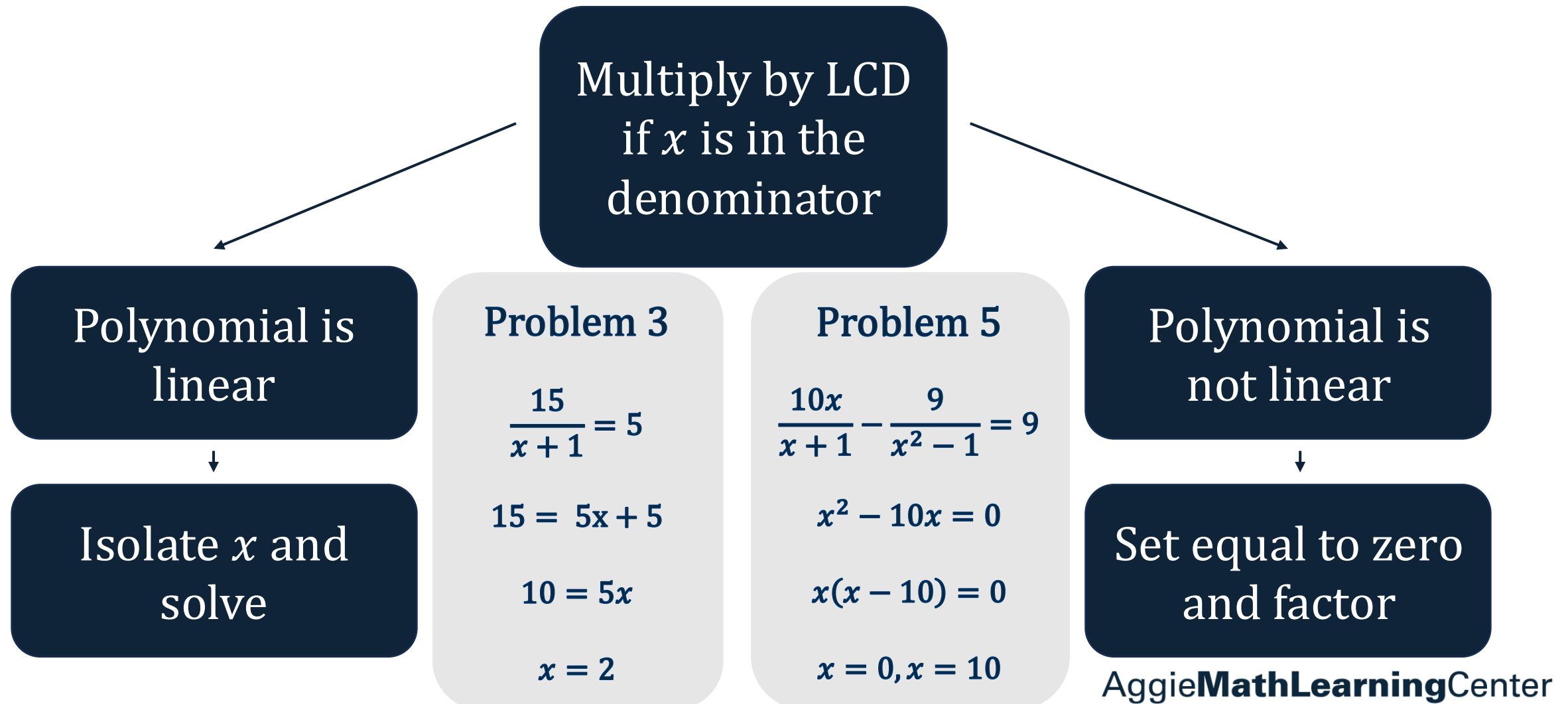
- Determine all the real number solutions to the rational equation

$$\frac{10x}{x+1} - \frac{9}{x^2-1} = 9$$

$$\frac{10x}{x+1} - \frac{9}{x^2-1} = 9$$

Solution: $x = 0$ and $x = 10$

Solving Equations with Complex Numbers



Problem 6

- Determine all the real number solutions to the equation

$$\sqrt{2x+1} \cdot (2x^2 + 5x - 2) \cdot (9x^2 - 12x + 4) = 0$$

$$\sqrt{2x+1} \cdot (2x^2 + 5x - 2) \cdot (9x^2 - 12x + 4) = 0$$

$$\text{Solution: } x = \left\{ \frac{2}{3}, -\frac{1}{2}, \frac{-5+\sqrt{41}}{4} \right\}$$

Problem 7

- Determine all the complex solutions to the equation

$$x^4 + 7x^2 = 8$$

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Solution: $x = \pm 1, \pm i\sqrt{8}$

Why Use U-Substitution?

U-substitution turns a complex equation:

$$x^4 + 7x^2 - 8 = 0$$



Let $u = x^2$



Into a simpler equation:

$$u^2 + 7u - 8 = 0$$



Solve like a quadratic

Problem 8

- What is the domain of the function f defined by the set
 $\{(-9,2), (-7,-1), (-5,-3), (-3,-5), (-2,1), (-1,2), (0,3)\}$

Solution: $\{-9, -7, -5, -3, -2, -1, 0\}$

Domain of a Function

Domain: All allowable inputs (x -values) of a function

Any real number input that has a real number output is in the domain.

Problem 9

- Use interval notation to write the domain of the function g defined as:

$$g(x) = \begin{cases} x^2, & -5 \leq x < -2 \\ 2x, & 4 < x < 6 \\ 5, & x = 2 \end{cases}$$

Solution: $[-5, -2) \cup [2] \cup (4, 6)$

Interval Notation

Symbol	Meaning
Parentheses ()	Not included
Brackets []	Included

Write intervals from least to greatest, connecting with $\cup$.

Examples		
$[-3,4)$	$[2,5) \cup (5,7)$	$[-5,1] \cup (5, \infty)$

Problem 10

- Use interval notation to write the domain of $h(x) = \frac{6\sqrt{9x-1}}{4x+3}$

Solution: $\left[\frac{1}{9}, \infty\right)$

Domain of a Function

When finding the domain, you should look for:

Function	Example
Piecewise Functions	$f(x) = \begin{cases} 3 - x \\ 5 + x \end{cases}$
Variable in the Denominator	$f(x) = \frac{5x}{2 - x}$
Even Roots with Variables	$f(x) = \sqrt{4 - 2x}$

Problem 11 – Part 1

Given the function $f(x) = 7x^2 - 2x + 5$, evaluate $f(3)$.

Solution: 62

Problem 11 – Part 2

Given $f(x) = 7x^2 - 2x + 5$, evaluate $f(x + h)$.

Solution: $7x^2 + 14hx + 7h^2 - 2x - 2h + 5$

Other Resources

Aggie Math Learning Center

- Visit usu.edu/math/amlc for more videos, resources, tutoring times, and recitation leader office hours

