



Extended College Algebra - MAC 1105
Departmental Syllabus
Revised Fall 2009 (by Anna Włodarczyk)

Text: Algebra and Trigonometry custom version for FIU (8th edition) by Michael Sullivan

Description: This course covers the material of Intermediate and College Algebra. The properties of real numbers, operations on polynomial and rational expressions and solving equations and inequalities (polynomial, rational, radical, absolute value) are studied first. Then, focus shifts to functions and their properties. In particular properties and graphs of linear, quadratic, rational, exponential and logarithmic functions are discussed. Ways of solving systems of equations and inequalities are introduced at the end of the semester.

Objectives: After finishing the course students should have a good understanding of the concept of a function, its domain and range. They should be able to graph basic functions and be familiar with their properties. They should be able to perform operations on functions, form composition and find the inverse of some one-to-one functions. They should know and be able to apply properties of logarithms. They should be able to solve exponential and logarithmic equations and systems of equations and inequalities.

Organization of the course: The class meets three times per week (Monday/Wednesday/Friday) for 1 hour and 50 minutes. In a regular semester there are about 42 110-minute meetings (or 84 50-minute lectures). A suggested pace is outlined below. The schedule allows for six 75-minute exams. At least 3 exams should be given before the drop date. The last exam must cover exponential and logarithmic functions. The 2.5 hour final exam is comprehensive and mandatory for all students. All sections will have a common departmental final. **The final exam must count for at least 25% of the final grade.**

Exams are to test students' knowledge and ability to perform specific tasks, so open book/notes, formula sheets/cards are not allowed. **Graphing calculators are prohibited in this course** and the use of scientific calculators should be reduced to minimum.

The suggested homework assignment is attached, but some students might need more practice so assign as many problems as you feel is necessary.

Suggested pace (the number of 50-minute lectures is given)

Chapter R (15 lectures)

Sec 1- 5, 7, 8

Sec 1 (*omit complement of a set*)

Chapter 1 (10 lectures)

Sec 1 – 2, 4 -7

Chapter 5 (2 lectures)

Sec 4 (*modify the process, so the concept of function is not used*)

Chapter 2 (5 lectures)

Sec 2.1 – 2.4

Sec 2.2 (*optional : testing an equation for symmetry*)

Chapter 3 (13 lectures)

Sec 1- 6 and the departmental handout : More on Functions (*attached*)

Sec 3.1 (*discuss the difference quotient; Ex # 73-80*)

Sec 3.3 (*Optional: local maxima and minima; do not cover objective 5 and the secant line*)

Sec 3.4 (*skip greatest integer function*)

Chapter 4 (5 lectures)

Sec 1, 3-5

Sec 4.1 (*omit objective 4*)

Sec 4.3 (*emphasize objectives 3 and 4*)

Sec 4.4 (*objective 1 only*)

Chapter 5 (3 lectures)

Sec 2 - 3

Sec 5.2 (*omit oblique asymptotes*)

Chapter 6 (15 lectures)

Sec 1 - 8

Sec 6.1 (*make sure to cover examples 6,7*)

Sec 6.4 (*students should understand what a logarithm to the base a of b is;
discuss the domain of logarithmic functions*)

Sec 6.6 (*objectives 1 and 2 only*)

Sec 6.8 (*optional: Newton's Law and Logistic models*)

Chapter 12 (4 lectures)

Sec 1, 6, 7

Sec 12.1 (*objectives 1-4 only; make sure that students understand what the solution of a
dependent system is; cover some word problems*)

MORE ON FUNCTIONS

For problems 1-19, find the domain of the function

$$1) f(x) = \frac{1}{2-3x}$$

$$2) f(x) = \frac{x-2}{x^2+5x+6}$$

$$3) f(x) = \frac{2x}{3-x^2}$$

$$4) f(x) = \frac{x-1}{x^2-7x+2}$$

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

$$6) f(x) = \frac{2x+1}{x(x+1)(x-3)}$$

$$7) f(x) = \frac{4x^2}{3x^2+6x}$$

$$8) f(x) = \frac{-2}{|3x+2|-1}$$

$$9) f(x) = \frac{1-x-x^2}{4|2x-3|+1}$$

$$10) f(x) = \sqrt{\frac{1}{3}x+2}$$

$$11) f(x) = \frac{-1}{\sqrt{3-2x}}$$

$$12) f(x) = \sqrt{6+x-x^2}$$

$$13) f(x) = \sqrt{\frac{x}{1-x}}$$

$$14) f(x) = \sqrt{x^2-4}$$

$$15) f(x) = \sqrt[3]{x+2}$$

$$16) f(x) = \sqrt{3x^2-x-2}$$

$$17) f(x) = \sqrt{\frac{x}{x^2-4x-5}}$$

$$18) f(x) = \frac{5}{\sqrt{4x+1}-2}$$

$$19) f(x) = \frac{3x-1}{\sqrt{x+5}+1}$$

For problems 20-25, find the x-intercepts, if any

$$20) f(x) = 3x^2 - 7x - 1$$

$$21) f(x) = 3(x-2) - (1-3x) - 1$$

$$22) f(x) = |2x+3| - 7$$

$$23) f(x) = \sqrt[4]{3x+1} - 2$$

$$24) f(x) = (3x-5)^{\frac{1}{2}} - 1$$

$$25) f(x) = (2x+1)^{\frac{1}{3}} + 1$$

26) Find values of x for which the graph of $f(x) = \frac{3x^2}{x^2-1}$ lies below the x-axis.

27) Find values of x for which the graph of $f(x) = |2x+3|$ lies below the graph of $g(x) = 4$.

28) Find values of x for which the graph of $f(x) = |4-2x|$ lies below the graph of $g(x) = 6$.

29) Find values of x for which the graph of $f(x) = |7-x|$ lies above the graph of $g(x) = 1$.

30) Find values of x for which the graph of $f(x) = |5x+8|$ lies above the graph of $g(x) = 2$.

ANSWERS

- 1) $\{x \mid x \neq \frac{2}{3}\} = (-\infty, \frac{2}{3}) \cup (\frac{2}{3}, +\infty)$.
- 2) $\{x \mid x \neq -3, -2\} = (-\infty, -3) \cup (-3, -2) \cup (-2, +\infty)$,
- 3) $\{x \mid x \neq -\sqrt{3}, \sqrt{3}\} = (-\infty, -\sqrt{3}) \cup (-\sqrt{3}, \sqrt{3}) \cup (\sqrt{3}, +\infty)$
- 4) $\{x \mid x \neq \frac{7-\sqrt{41}}{2}, \frac{7+\sqrt{41}}{2}\} = (-\infty, \frac{7-\sqrt{41}}{2}) \cup (\frac{7-\sqrt{41}}{2}, \frac{7+\sqrt{41}}{2}) \cup (\frac{7+\sqrt{41}}{2}, +\infty)$
- 5) $(-\infty, +\infty)$
- 6) $\{x \mid x \neq -1, 0, 3\} = (-\infty, -1) \cup (-1, 0) \cup (0, 3) \cup (3, +\infty)$
- 7) $\{x \mid x \neq -2, 0\} = (-\infty, -2) \cup (-2, 0) \cup (0, +\infty)$
- 8) $\{x \mid x \neq -\frac{1}{3}, -1\} = (-\infty, -1) \cup (-1, -\frac{1}{3}) \cup (-\frac{1}{3}, +\infty)$
- 9) $(-\infty + \infty)$
- 10) $\{x \mid x \geq -6\} = [-6, +\infty)$
- 11) $\{x \mid x < \frac{3}{2}\} = (-\infty, \frac{3}{2})$
- 12) $\{x \mid -2 \leq x \leq 3\} = [-2, 3]$
- 13) $\{x \mid 0 \leq x < 1\} = [0, 1)$
- 14) $\{x \mid x \leq -2 \text{ or } x \geq 2\} = (-\infty, -2] \cup [2, +\infty)$
- 15) $(-\infty, +\infty)$
- 16) $\{x \mid x \leq -\frac{2}{3} \text{ or } x \geq 1\} = (-\infty, -\frac{2}{3}] \cup [1, +\infty)$
- 17) $\{x \mid -1 < x \leq 0 \text{ or } x > 5\} = (-1, 0] \cup (5, +\infty)$
- 18) $\{x \mid x \geq -\frac{1}{4}, x \neq \frac{3}{4}\} = [-\frac{1}{4}, \frac{3}{4}) \cup (\frac{3}{4}, +\infty)$
- 19) $\{x \mid x \geq -5\} = [-5, +\infty)$
- 20) $\left(\frac{7-\sqrt{61}}{6}, 0\right), \left(\frac{7+\sqrt{61}}{6}, 0\right)$
- 21) $\left(\frac{4}{3}, 0\right)$
- 22) $(2, 0), (-5, 0)$
- 23) $(5, 0)$
- 24) $(2, 0)$
- 25) $(-1, 0)$
- 26) $x \text{ in } (-1, 0) \cup (0, 1)$
- 27) $x \text{ in } \left(-\frac{7}{2}, \frac{1}{2}\right)$
- 28) $x \text{ in } (-1, 5)$
- 29) $x \text{ in } (-\infty, 6) \cup (8, \infty)$
- 30) $x \text{ in } (-\infty, -2) \cup \left(-\frac{6}{5}, \infty\right)$

Suggested Homework Assignment

section	problems
R.1	1- 13odd, 21-38 odd, 39-86 all, 87-98 odd
R.2	1-11 odd, 13-32 all,33-134odd
R.3	1-49 odd
R.4	1-104 odd
R.5	1-128 odd
R.7	1-92 odd
R.8	1-107 odd
1.1	9- 64 odd, 75,77,79, 85, 86, 87, 89, 91
1.2	1-98 odd, 101,103, 105, 107,109
1.4	1- 92 odd
1.5	1- 101 odd, 105
1.6	1-62 odd, 63, 65
1.7	7, 11, 17, 19, 21, 23, 25, 27, 31, 33,35,39
5.4	3- 40 odd
2.1	11,13, 14, 15,19,23,29, 33, 35,40, 45,47, 49, 63
2.2	11, 15, 19, 21,25, 27, 31,35, 39-46odd, 51-54, 71, 72, 75, <i>55-69 find intercepts only unless covering tests for symmetries</i>
2.3	1-98 every third
2.4	7,9,11,15,17, 21,23,25,27,29, 31,33,35,39
3.1	15,17,19,21,27,31,32,36,40,43,45,47-60,65,68,70,73,75,79,80,81,87,90
3.2	9,10,11,12,13,18,20,25
3.3	11-20, 21,23,25,27,35,36,42,5329, <i>if covering extrema departmental handout More on Functions</i>
3.4	17-38, 41, 42, 43, 47, 49
3.5	7,9,11, 13,19-22,24,25, 29, 35,37,39,44,46,47,51,53,55,65a-e,
3.6	1a-c, 7a-b,11a-b, 18
4.1	17,18, 19, 37, 39
4.3	11,17, 21,27,32,35,41,43,45,47,53, 57, 61,65,81,86
4.4	5,7,9,11,15, 19
4.5	3,7, 9, 11,13,15, 17, 19
5.2	13,15,17,20,23-28a-d,35,36,39, 41-52 (<i>omit oblique asymptotes if not covering</i>)
5.3	7,9, 11, 19,20,23, 33, 35,37
6.1	11,17,21,27, 35,41,49, 53-58
6.2	9,11,17,19,23, 33,37,41,42, 57, 61,65
6.3	11,17,18,37,39,45,49, 50,53, 59,63,67,73,79,97,99
6.4	9,11,15,16,21,23,24,25-36, 37, 43, 45, 47, 51,55,59,71,77,83,87,91,97,99,103,107,117
6.5	9,11,13,15,17,25,29,37,41,43,45,47,49,51,55,57,59,61,63,65,69
6.6	6,9,11,15,16,19,21,23,27,29,31,33,39,41,42,49,53,55,59
6.7	3,5,7,11,15,19,39,43,45, 49
6.8	1,3,5,9,21
12.1	19,25,26,27, 29,30, 57,63,64
12.6	5,7,9,13,15,27,28,29
12.7	11-19,23,25,29,33,37,43,45,47