



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

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

Description: The focus of this course is on 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 either twice a week (Tuesday/Thursday) for 75 minutes or three times per week (Monday/Wednesday/Friday) for 50 minutes. In a regular semester there are about 28 75-minute and 42 50-minute lectures. A suggested pace is outlined below. The schedule allows for in-class exams: three 75-minute exams for 2-day schedule and five 50-minute exams for 3-day schedule. At least two exams must 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 25% of the final grade.**

The 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 lectures for a 2-day schedule is given, the corresponding number for a 3-day schedule is in parenthesis)

Chapter R - 4.5 (6) lectures

Sec R.2 (*objectives 5 and 6 only*)

Sec R.4

Sec R.5

Sec R.7

Sec R.8

Chapter 2 - 3 (4) lectures

Sec 2.1

Sec 2.2 (optional : testing an equation for symmetry) together with 1.2
(when finding intercepts use examples that lead to quadratic equations, review methods of solving such equations(factoring, square root method), then assign homework from both sections)

Sec 2.3

Sec 2.4 (you can use the general equation of a circle to find intercepts as means of reviewing solving equations by using quadratic formula; assign problems from sec 1.2 dealing with such equations)

Chapter 3 – 6 (8) lectures

Sec 3.1 (make sure to discuss the difference quotient; Ex # 73-80)

Sec 3.2

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

Departmental handout : More on Functions (attached) and Sec 5.4 (review sec 5.4 while covering departmental handout and then assign homework from the handout and sec 5.4; problems on the handout that lead to quadratic equations can be assigned as supplemental HW)

Sec 3.4 (skip greatest integer function)

Sec 3.5

Sec 3.6

Chapter 4 – 2 (4) lectures

Sec 4.3 (emphasize objectives 3 and 4)

Sec 4.4 (objective 1 only)

Sec 4.1 optional (cover objectives 1-3 very briefly)

Sec 4.5 optional (can be combined with 4.4; show 1-2 examples)

Chapter 5 – 1.5 (3) lectures

Sec 5.2 (omit oblique asymptotes)

Sec 5.3

Chapter 6 – 6 (10) lectures

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

Sec 6.2

Sec 6.3

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

Sec 6.5

Sec 6.6 (objectives 1 and 2 only)

Sec 6.7

Sec 6.8 optional (if you omit this section, make sure to assign some word problems from sec 6.3 and 6.4)

Chapter 12 – 2 (3) lectures

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

Sec 12.6

Sec 12.7

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.2	73-94, 95, 103, 105
R.4	17, 21, 23, 25,29,35,37,39,43, 45,49,55,57,59,67,71,75,79, 84,87,93,95,99
R.5	9,11,13,15, 17,21 25,27,33-38,39, 43,45,51, 53,54,57,59,63,86,91,93,95,96,99,105,107, 109,117, 119,121, 123
R.7	5,8,11,13,15,19,21,23,25,28,31,33,37,41,43,47,49,51,61-71,73,75,76,81,85,87
R.8	7,12,15,17,18,21,23,25,29,31,33,37,41,43,47,48,49,51,53,55-74, 77,81
2.1	11,15,19,24,35,45,47
2.2 +	11, 21,31,39,40, 41,43, 51-54, <i>59,61,63,68 find intercepts only unless covering tests for symmetries</i>
1.2	13, 15, 21, 29, 31, 21, 42, 47, 55, 79, 85, 89
2.3	13, 21,23, 25,27,29, 37,39,41,43,47,49,53,55,57,61,63,64, 67,69,70,77,83,85,89, 93, 103,104,105
2.4	7,9,11,15,21,23,25,27,31
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, 21,23,25,27,35,36,42,53 <i>29, if covering extrema</i>
5.4	3, 5, 7, 11, 13, 21, 23, 25
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(optional)	17,18, 19, 37, 39
4.3	17, 27,32,35,41,43,45,47,57, 61,65,81,86
4.4	5,7,9,11,19
4.5(optional)	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</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(optional)	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