Precalculus 1, 161

Spring 2020

CRN 10585

Section 110

Time: Thursday, 6:30 p.m. – 9:35 p.m.

Room 204

CRN 10582

Section 009

Time: Saturday, 12:30 p.m. – 3:35 p.m.

Room BR-11

SYLLABUS

Catalog description

Functions and relations and their graphs, transformations and symmetries; composition of functions; one-to-one functions and their inverses; polynomial functions; complex numbers; rational functions; conic sections. Prerequisite: MATH 118 with a grade of "C" or better

Learning outcomes

Upon successful completion of this course, students will be able to:

1. Determine basic properties of functions
2. Perform operations on functions
3. Graph polynomial and rational functions.
4. Perform operations on complex numbers
5. Find real and complex roots of quadratic functions.
6. Graph transformations of functions
7. Graph and determine properties of conic sections

Book: **Stewart, Redlin, Watson**
Math 161 Custom Edition for Community College of Philadelphia. The 7-th edition.
Cengage Learning. ISBN 978-1-337-05607-6

Instructor: **Dr. Arkady Kitover.**

Office: **Main campus, B2-25J, NE campus, 327.**

Office hours: **NE campus, TWR 4:30 pm - 6:00 pm.**
Main campus, S, 3:40 p.m. – 4:40 p.m. (by appointment only)

Email: akitover@ccp.edu or akitover@hotmail.com (Email is the best way to contact me).

Web Page: http://faculty.ccp.edu/FACULTY/akitover
The web page contains the syllabus, recommended homework, and the reviews with complete solutions.

COURSE OUTLINE

Part 1. Linear functions and straight lines. Sections 1.10 and 2.5

- **(a) The domain and the range of a linear function $y = ax + b$.**
- **(b) Compositions of linear functions.**
- **(c) Inverses of linear functions $(a \neq 0)$. The symmetry between the graphs of a function and its inverse.**
- **(d) Slope and intercept. Slope – intercept and point – slope forms.**
- **(e) Horizontal and vertical lines.**
- **(f) Parallel and perpendicular lines.**

Review 1

Test 1 (50 points)
Part 2. Quadratic functions. Section 3.1

- **(a) The standard form of a quadratic function. The vertex.**
- **(b) The domain and the range of a quadratic function.**
- **(c) The quadratic formula and the discriminant.**
- **(d) The inverse of a quadratic function with restricted domain.**
- **(e) Graphing quadratic functions and their inverses.**
- **(f) Applications of quadratic functions.**

Review 2

Test 2 (50 points)

Part 3. Polynomial equations. Sections 1.5, 1.6, 3.3, 3.4, 3.5.

(a) Complex numbers. Addition and subtraction of complex numbers.
(b) Multiplication of complex numbers. Conjugate complex numbers. Division of complex numbers.
(c) The main theorem of algebra.
(d) Solving quadratic equations and equations reducible to quadratic.
(e) The remainder and the factor theorems.
(f) Synthetic division
(g) The rational roots test.
(h) Some additional topics on finding roots of polynomial equations (if time allows).

Review 3

Test 3 (50 points)

Part 4. Relations and Functions. Sections 2.1, 2.2, 2.5 - 2.8.

(a) Relations. The domain and the range of a relation. Graphs of relations. Inverse relations.
(b) Functions. What relations are functions? Vertical line test.
(c) Compositions of functions. The domain and the range of a composition.
(d) One-to-one functions and their inverses. Horizontal line test. Example: radical functions $\sqrt[n]{x}$ as inverses to power functions x^n.

Review 4

Test 4 (50 points)

Part 5. Polynomial and rational functions. Sections 3.2 and 3.6

(a) How to graph a completely factored polynomial?
(b) Polynomials of quadratic type $ax^{2n} + bx^n + c$, their range and their graphs.

(c) **Linear fractions** $y = \dfrac{ax+b}{cx+d}$**, their inverses, and their graphs. Horizontal and vertical asymptotes. When does the graph of a general rational function have a horizontal asymptote?**

(d) **Rational functions** $y = \dfrac{ax^2+bx+c}{dx+f}$ **and their graphs. Slant asymptotes. When does the graph of a general rational function have a slant asymptote?**

(e) **How to graph a rational function when both its numerator and its denominator are completely factored?**

Review 5

Test 5 (50 points)

Part 6. Analytic Geometry. Sections 1.9 and 11.1 – 11.4

(a) **The distance formula. Circles. Standard equations of circles.**

(b) **General equations of circles. Bringing general equations of circles to the standard form.**

(c) **Ellipse. The geometric definition, major and minor axes, foci, vertices, eccentricity.**

(d) **Standard equation of an ellipse.**

(e) **Parabola. The geometric definition. Focus, vertex, and directrix.**

(f) **Standard equation of a parabola.**

(g) **Hyperbola. The geometric definition. Foci, vertices, and asymptotes.**

(h) **Standard equation of a hyperbola.**

(i) **Circle, ellipse, parabola, and hyperbola as conic sections. General equations of conic sections. Shift of coordinate axes.**

Review 6

Test 6 (50 points)

Review for the final exam

Final exam (100 points)

Grading
I will drop the lowest grade of the grades for the six 50-points tests. The grade for the final will not be dropped. You can make up each of the regular class tests; not more than one make up for every test; no make up for the final.

A: 90 – 100 % (315 – 350 points)
B: 80 – 89% (280 – 314 points)
C: 70 – 79 % (245 – 279 points)
D: 60 – 69 % (215 – 244 points)
F: 0 – 59 % (0 – 214 points)

If a student misses a test without a valid excuse, I will consider it as the lowest grade test.

All the students must take the final exam. Students who miss the final without a valid excuse will be assigned the grade of "F". Students who miss the final with a valid excuse will be assigned the grade of "incomplete" and will have to take the final at the beginning of the next semester.

Class Rules

ATTENDANCE: According to college rules the students must attend all classes. Moreover, good attendance strongly correlates with the success in this class. It is especially important for classes meeting once a week. By these reasons I will call the roll twice: 20 min. after the class starts and at the end of the class. For each missed roll I will subtract 5 points from your total. If you need to be excused from class send me an email BEFORE the class starts. Of course, I will make an exception in the case of an emergency. Students who do not miss any roll or have DOCUMENTED excuse for each case of missing the roll will receive 50 extra points added to their total at the end of semester.

Please no food in the classroom. Beverages are allowed.

Cell phones must be put in the vibration mode BEFORE the class starts.

You may not use electronic devices in the classroom for purposes not related to the class material. (Texting, surfing the web, et cetera). I will subtract 10 points from your total sum for each violation of this rule.

You may not use cell phones, otherwise as calculators during a test.

Recommended homework

The homework problems will be discussed in class, but I strongly recommend that first you try to solve them at home.
The numbers of sections, pages, and problems correspond to the book by Stewart, Redlin and Watson "Math 161 Custom Edition for Community College of Philadelphia". Edition 7.

Section	Pages	Problems
1.10	114 - 115	19, 25, 27, 29, 31, 51, 75, 77
2.5	196	19, 27, 31, 47, 75, 79
3.1	252 – 254	9, 15, 35, 37, 43, 63, 67
1.5	56 – 57	59, 65, 81, 85, 89
1.6	64	9, 15, 19, 25, 29, 33, 39, 41, 45, 49, 57, 63, 71
3.5	293 – 294	13, 29, 35, 41, 59, 69
3.3	274	27, 33, 43, 47, 53, 55
3.4	283 – 284	19, 33, 45, 83
2.1	156 – 157	15, 23, 43, 57
2.2	159 – 162	39, 49, 57, 67, 75, 77
2.6	206 - 207	21, 25, 33, 37, 43, 53
2.7	216 – 217	19, 27, 37, 41, 53
2.8	226 - 227	37, 43, 45, 53, 57, 61, 69
3.2	266 – 267	21, 29, 35, 63
3.6	308 – 309	35, 45, 59, 61
1.9	192 – 104	11, 33, 85, 89, 93
11. 1	788 – 789	11, 17, 27, 29, 35
11.2	796 – 797	11, 21, 35, 39
11.3	805 – 806	13, 21, 31, 37, 41
11.4	814 – 815	5, 9, 19, 25, 31