Suffolk County Community College

Michael J. Grant Campus

Department of Mathematics

Fall 2021 — Special Version

MAT 111
Algebra-II

Final Exam

Instructor:

Name: Alexander Kasiukov
Office: Health, Sports and Education Center, Room A-109
Phone: (631) 851-6484
Email: kasiuka@sunysuffolk.edu
Web Site: `http://www.kasiukov.com`

Please print the requested information in the spaces provided:

Student:

Name:

Student Id:

Email: *include to receive the final grade via email* ONLY *if you are not getting email updates*

- *Notes and books are permitted on this exam.*
- *Graphing calculators, computers, cell phones and any communication-capable devices are prohibited. Their mere presence in the open (even without use) is a sufficient reason for an immediate dismissal from this exam with a failing grade.*
- *You will not receive full credit if there is no work shown, even if you have the right answer. Please don't attach additional pieces of paper: if you run out of space, please ask for another blank final.*

Problem 1. In this problem we will, through a series of sub-problems, solve the system of equations

$$\begin{cases} 3x + 5y + 2z = 8 \\ 2x + 3y + 5z = 7 \\ 4x + 8y + z = 17 \end{cases}$$

using Gauß-Jordan method. Any other solution will not be accepted, so please keep your work relevant to the specific question being asked in each sub-problem.

(1). Write the augmented matrix of this system of equations.

Space for your solution:

(2). Find the elementary row transformation that would make the top left corner of the augmented matrix equal to 1, while avoiding any fractions in the resulting matrix. Perform that transformation and make it explicit by using the R_i notation.

Space for your solution:

(3). Add multiples of the first row to the second and third row in a way that would make the first column entries of these two rows equal to zero. Make the row transformations explicit by using the R_i notation.

Space for your solution:

(4). Use elementary row transformations to turn the matrix into the so-called *upper-triangular form* by making all entries on the diagonal equal to 1 and all entries below the diagonal equal to 0. Make the row transformations explicit by using the R_i notation.

Space for your solution:

(5). Use elementary row transformations to turn into zero all entries above the leader of the third row. Make the row transformations explicit by using the R_i notation.

Space for your solution:

(6). Use elementary row transformations to turn into zero all entries above the leader of the second row. Make the row transformations explicit by using the R_i notation.

Space for your solution:

(7). Based on the answer to the previous sub-problem, determine the solution of the original system:

$$\begin{cases} x = \\ y = \\ z = \end{cases}$$

Space for your solution:

Problem 2. Solve the inequality:

$$x + 2 < 2 - 2 \cdot |x + 3|.$$

Space for your solution:

Problem 3. Consider the quadratic polynomial $2x^2 + 4x - 16$.

(1). Perform the completion of the square.

Space for your solution:

(2). Use the result of completion of the square to sketch the graph of that polynomial.

Space for your solution:

(3). Use the result of completion of the square to find the vertex of the parabola, and mark it on the sketch in sub-problem 2.

Space for your solution:

(4). Use the result of completion of the square and the difference-of-two-squares formula to find the roots of that polynomial, and mark them on the sketch in sub-problem 2.

Space for your solution: