

Suffolk County Community College
Michael J. Grant Campus
Department of Mathematics

Wednesday, May 13, 2026

MAT 120
College Algebra and Trigonometry
Final Exam

Instructor:

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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

- *Any violation of academic integrity on this exam will result in a failing grade for the whole course.*
- *Notes and books are permitted, but cannot be shared.*
- *Graphing calculators, smartwatches, computers, cell phones and any other communication-capable devices are prohibited. Their mere presence in the open — even without use — is a violation of academic integrity.*
- *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 consider functions $3 + \log_2 x$ and $\log_2(3 + x)$.

(1). Solve the equation $3 + \log_2 x = \log_2(3 + x)$ analytically.

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(2). Using the technique of graph transformations, sketch the graphs of these functions in the same (x, y) -coordinate system. Is this sketch consistent with your solution of part (1)?

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Problem 2. Solve the equation $3^{1-2x} = 4^x$.

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Problem 3. Use transformations of the graph $\log_2(x)$ to sketch, in the same system of coordinates, the graphs of the two functions, $\log_2(x) + 1$ and $\log_2(x + 1)$.

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Problem 4. Solve the equation

$$\log_2(x) + 1 = \log_2(x + 1)$$

and check if your solution is consistent with the above sketch.

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Problem 5. Consider the function with the range \mathbb{R} , defined by the formula

$$f(x) = \frac{2x^3 - 5x^2 + 7}{x^2 - 4x + 4}$$

for all $x \in \mathbb{R}$, for which the above formula makes sense.

(1). What is the domain of the function f ?

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(2). Find all the vertical asymptotes of the graph of $f(x)$.

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(3). Find the y -intercept of $f(x)$.

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(4). Perform long division of the numerator of $f(x)$ by its denominator. Using the results of the long division, write $f(x)$ as a sum of a polynomial and a proper fraction.

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(5). Find the equation of the oblique asymptote of $f(x)$.

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(6). Find all the intersections of the graph of $f(x)$ with the oblique asymptote. (Only the x -coordinates of the intersections are needed.)

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(7). Use the Rational Roots Theorem to find a rational root of $2x^3 - 5x^2 + 7$.

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(8). Use the result of the previous subproblem to find all x -intercepts of the function $f(x)$.

Space for your solution:

(9). Use the result of the previous sub-problems to sketch the graph of the function f . Mark all vertical, horizontal and oblique asymptotes, as well as all intersections of the graph with the asymptotes and the axis, if any.

Space for your solution: