

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

Spring 2022

MAT 124
Pre-Calculus I

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

- *Notes and books are permitted on this exam.*
- *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 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. Suppose

- set $A = \{\text{flu, headache, fever, allergy, Lime disease}\}$;
- set $B = \{\text{Aspirin, Relenza, Claritin, Doxycycline}\}$;
- set $C =$

$$\left\{ (\text{flu, Relenza}), (\text{headache, Aspirin}), (\text{fever, Aspirin}), \right. \\ \left. (\text{allergy, Claritin}), (\text{Lime disease, Doxycycline}) \right\}.$$

(1). Does the tripple $T = (A, B, C)$ constitute a binary relation? Why?

Space for your solution:

(2). Does the tripple $T = (A, B, C)$ constitute a function? Why?

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(3). What is $T(\text{headache})$?

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(4). What is the image of T ?

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(5). Is T invertible? If yes, find (the domain, the range, and the graph of) the inverse. If no — or the question itself does not make sense — explain why.

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Problem 2. Consider the function with the range \mathbb{R} , defined by the formula

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

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

(1). With the usual conventions in effect, what is the domain of the function f ?

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(2). Find all x -intercepts of the function $f(x)$.

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(3). Express $f(x)$ as a sum of a polynomial and a proper rational function.

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(4). Based on the results of the previous sub-problem, determine the oblique asymptote of the function $f(x)$ and the value of x corresponding to the intersection of $f(x)$ with that asymptote.

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(5). Sketch the graph of the function $f(x)$.

Space for your solution:

Problem 3. 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)?

Space for your solution: