

Name_____

MATH-110: Calculus I

Fall 2016

Siena College

Test 1 Take Home

For each question I would like you to show and explain each question and how you solve it. It is a very important skill to be able to communicate your thoughts and ideas in an understandable way. When reading your work I would like to know what you were thinking when solving the problem.

I'd recommend looking at all the questions first so you can think about them while solving other problems.

For problems 1-2 do the following and explain your reasoning. (Answer **Why?**) (20 points each)

- a) Identify the **Domain** (1 point)
- b) Identify the **Range** (1 point)
- c) Identify any **Zeros** (1 point)
- d) Identify the intervals where the function is **One-to-One (1-1)** (2 points)
- e) Identify any **Vertical Asymptotes** (4 points) and for each:
 - i) Find the Left Limit
 - ii) Find the Right Limit
 - iii) Find the Normal Limit
- f) Identify any **Horizontal Asymptotes** and identify long term behavior as x approaches $\pm\infty$ (4 points)
- g) Identify any **Slant Asymptotes** (bonus 2 points if it exists)
- h) Identify on what intervals the function is **Continuous** (3 points)
- i) Make a **Sketch** (4 points)

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1.

$$f_1(x) = \frac{x}{(x-9)(x-4)^2(x-5)^3}$$

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2.

$$f_2(x) = \frac{(x+10)(x-2)^2(x-3)^3}{(x+2)^2(x-8)^3}$$

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3. Intermediate Value Theorem: (10 points each)

For each question below answer the following questions and explain:
Is this True or False? Are there any assumptions need to be made?

You might need to think a bit about these.

Hint: They are both True with the right assumptions.

- i) Throughout my day I travel a lot, from home to Siena, back home, etc... Assuming that I start my day laying in my bed and end the day laying in my bed it is guaranteed that at some point in my day my head will be at the exact same elevation as it was initially.

- ii) My friend told me that if you have a table with 4 legs and it's wobbly I can just rotate the table and at some point it won't wobble any more.
(<https://www.mathsisfun.com/algebra/intermediate-value-theorem.html>)