

Print and sign a brief statement stating this is your work and you used no other resource:

Name (sign): _____

Name (print): _____

Student Number: _____

Instructor's Name: _____

Class Time: _____

Problem Number	Points Possible	Points Made
??	0	
??	27	
??	10	
??	5	
??	15	
??	18	
??	15	
??	10	
Total:	100	

- If you need extra space use the last page.
- Please show your work. **An unjustified answer may receive little or no credit.**
- If you make use of a theorem to justify a conclusion then state the theorem used by name.
- Your work must be **neat**. This will make it easier to properly grade and give you the credit you deserve.
- The total number of possible points that is assigned for each problem is shown here. The number of points for each subproblem is shown within the exam.
- You are not allowed to have a mobile phone nor a watch.
- A calculator is not necessary, but numerical answers should be given in a form that can be directly entered into a calculator.

Common identities:

$$\cos(\alpha + \beta) = \cos(\alpha) \cos(\beta) - \sin(\alpha) \sin(\beta), \quad \sin(\alpha + \beta) = \sin(\alpha) \cos(\beta) + \cos(\alpha) \sin(\beta).$$

1. Common Knowledge: Provide a brief summary of the Milan-San Remo Donne and indicate the pivotal moments in the race.

2. Determine all of the values of x for each question below that satisfy the given equation. If no values of x satisfy the equation provide a brief justification as to how you arrived at your conclusion.

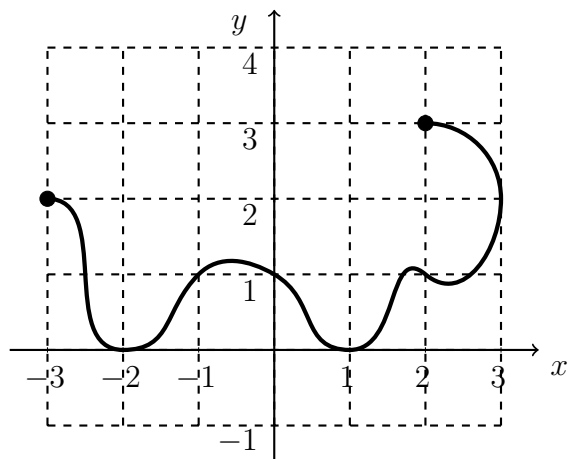
(a) $\ln(6 - 3x) = 14$.

(b) $e^{8x} = 7 \cdot e^{-2x}$.

(c) $\frac{\log_3(2x+1)}{\log_3(x-1)} = 2.$

(d) $3^{8x+1} = 6 \cdot \left(\frac{1}{2}\right)^{1-x}.$

3. The questions below refer to the relationship whose graph is shown below.



- (a) Explain why the relationship is not a function. Define a restriction on the domain so that the relationship is a function on the restricted domain, and the interval you define is as large as possible.
- (b) Using the restriction you defined above, 3(a), determine whether or not the function is one-to-one. If not then define another restriction so the function is one-to-one, and the range of the function on the restriction is the same as the range of the function in your definition above.

4. Determine the domain of the function

$$q(x) = \log(3 - x) + \log(3 + x).$$

5. Determine the exact numerical value of each expression below. Do not use a calculator and show the steps required to arrive at your conclusion. Your final answer should not contain any exponential function or logarithmic functions.

(a) $\ln(e^3 \cdot e^{-4})$

(b) $\frac{e^{2\ln(5)}}{\ln(e^2)}$

(c) $\log_5(25 \cdot 5^{-4})$

6. Initially, \$10,000 is deposited into a bank account. The interest on the bank account is compounded annually.

(a) If the interest rate is compounded monthly at a rate of 3% determine how much money in the account after two years.

(b) If the interest rate is compounded monthly at a rate of 3% determine how long you will have to wait until the balance will be \$15,000.

(c) What interest rate would be required for the principle to double in twenty years if it is compounded monthly?

7. The questions below refer to the following two functions,

$$\begin{aligned}u(x) &= \ln(x) + 4, \\w(x) &= \ln(a \cdot x).\end{aligned}$$

(a) Determine all of the possible values of x that ensure $u(x)$ is greater than 10. (Your answer should be in interval notation.)

(b) Determine all of the possible values of a that ensure the function $w(x)$ is well defined. (Your answer should be in interval notation.)

(c) Determine all possible values of a that ensure that $u(x)$ is greater than $w(x)$ and $w(x)$ is defined for all positive values of x . (Your answer should be in interval notation.)

8. A previously benevolent scientist, Robert, was called “Bob” by one of his students, and it was the final straw. To celebrate his transition to committing evil deeds, Dr. Robert develops a new poison that replicates itself so that every thirty hours the amount of poison increases by five percent. (The amount of poison can be modeled using an exponential function.) Dr. Robert initially creates 0.05kg of the substance, and goes on a trip to Helen to celebrate this achievement. If it takes 800kg of the substance to ruin his lab, how long can Dr. Robert be away and be able to keep his lab?

Extra space for work. **Do not detach this page.** If you want us to consider the work on this page you should print your name, instructor and class meeting time below.

Name (print): _____ Instructor (print): _____ Time: _____