

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: _____

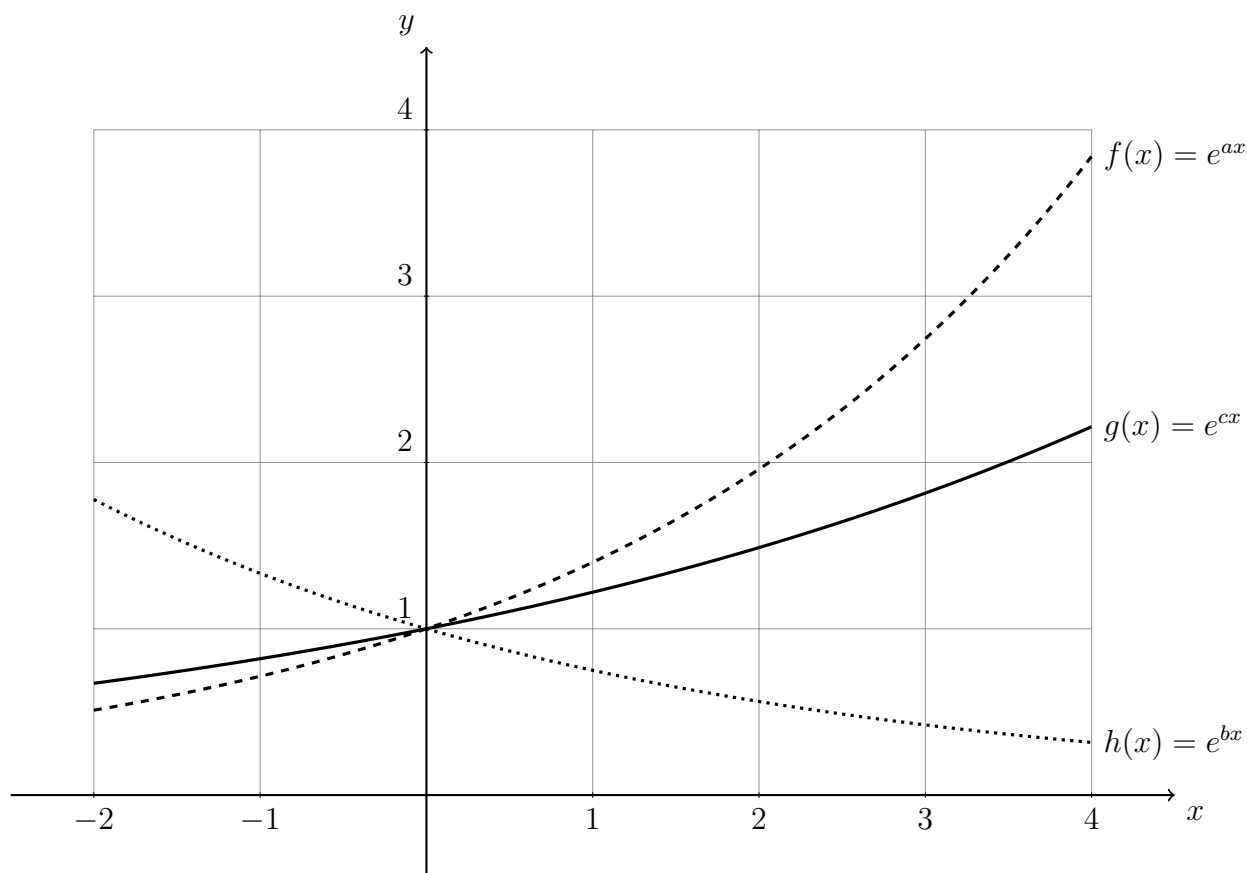
Problem Number	Points Possible	Points Made
??	15	
??	15	
??	20	
??	10	
??	10	
??	15	
??	15	
Total:	100	

- 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**. If I can't read it (or can't find it), I can't grade it.
- 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.
- Please turn off your mobile phone.
- 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. The graph of three functions is given in the plot below. Use the graph to answer the questions below.



(a)

List the numbers a , b , and c from lowest to highest. (Do not estimate their values just list them to specify which one is lowest, the middle value, and the highest value.)

(b)

Which value(s) (a , b , or c) are negative?

(c)

Is $f(x)$ a one-to-one function? (Briefly explain your reasoning based on the graph of the function.)

2. For each scenario below circle the phrase that best describes the **kind** of function that will best approximate the phenomena described.

(a)

The amount of radioactive material present after a given time period.

Linear
Function

Quadratic
Function

Exponential
Function

(b)

The number of shoes produced at a factory as a function of time where the shoes are produced at a constant rate.

Linear
Function

Quadratic
Function

Exponential
Function

(c)

The amount of material present decays due to bacteria and the amount that degrades depends on the amount of material present.

Linear
Function

Quadratic
Function

Exponential
Function

(d)

The area of a square as a function of the length of its sides.

Linear
Function

Quadratic
Function

Exponential
Function

(e)

The number of animals present in a population, and the number of births depends on the number of animals present.

Linear
Function

Quadratic
Function

Exponential
Function

3. Determine the values of x that satisfies each equation below. Print your answer in the box provided, and your answer should be an exact answer. (No decimal approximations.)

(a)

$$\ln(3x) - \ln(x - 1) = 2.$$

$$8 \cdot 3^x = 7^x.$$

(b)

4. Determine if the function

$$L(x) = \sqrt{x} + 4$$

is a one-to-one function. (Fully justify your reasoning without referring to the graph of the function.)

5.

Determine the inverse of the function

$$K(x) = 3e^{4t}.$$

6. Given the relationship

$$\ln(y) = 3\ln(x+1) - 2\ln(x-4) + \ln(x-2)$$

answer the following questions.

(a) Determine the smallest value of a so that the equation above is valid for all $x > a$.

(b) Determine an equation for y as a function of x that does not include any logarithms.

7. A radioactive material decays. There is initially 10 kg of material, and after 40 years there is 8 kg of material. How long will it takes before the amount is reduced by 50% from the original amount?

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: _____