

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	
??	16	
??	12	
??	12	
??	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:

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

(a)

1. Determine all of the values of x for each equation below that satisfies the expression.

$$e^{3x+1} = \ln(4)$$

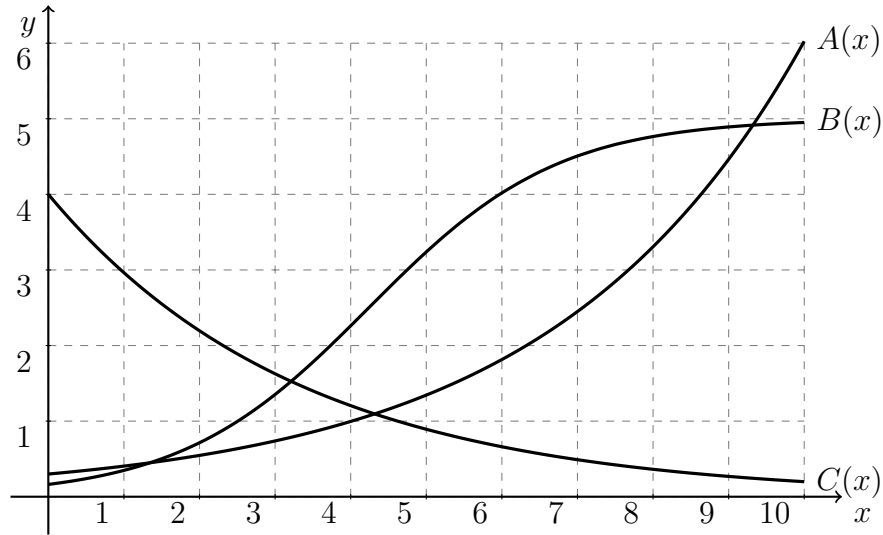
(b)

$$\ln(8x - 1) = 2$$

$$3 \cdot 4^{x+1} = 87$$

(c)

2. The graphs of three functions are given in the plot below.



(a)

Circle the type of function that best describes $A(x)$.

Exponential
Decay

Exponential
Growth

Logistic
Function

Linear

(b)

Circle the type of function that best describes $B(x)$.

Exponential
Decay

Exponential
Growth

Logistic
Function

Linear

(c)

Circle the type of function that best describes $C(x)$.

Exponential
Decay

Exponential
Growth

Logistic
Function

Linear

3. Given the following values determine the exact numerical value of each of the expressions below,

$$\begin{aligned}\ln(a) &= 4.5, \\ \ln(b) &= -1.5, \\ e^r &= 100.8, \\ e^s &= 44.0.\end{aligned}$$

Use the algebraic properties of the functions to rearrange the expressions in a form where the values above can be substituted into the expressions.

(a)

$$\ln(a \cdot b)$$

(b)

$$\ln\left(\frac{a^2}{b}\right)$$

(c)

$$e^{2r+s}$$

(d)

$$e^{r-3s}$$

4.

Determine the inverse of the function

$$R(x) = 3 + e^{-2x}.$$

5. A bank account is opened with an initial balance of \$1,000. The bank compounds the interest monthly at an annual rate of 1.2%.

(a)

What is the balance after 3 years?

What would the balance be after 3 years if the interest is compounded weekly?

(b)

6. The amount of a radioactive compound in a sample decays exponentially. The sample initially contains 50g of the compound, and after three years contains 40g. How long will it take until there is 30g of material?

7.

The number of insects in a population of angry wasps increases by 15% each year. The population is cut in half due to a sudden weather event. How long will it take for the population to return to its previous number?

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: _____