

Name \_\_\_\_\_

ID number \_\_\_\_\_ Date \_\_\_\_\_ Group \_\_\_\_\_

*“Adhering to the Code of Ethics for students of the Tec de Monterrey, I pledge to follow the precepts of academic honesty in this evaluation by not using unauthorized or illicit resources to solve it.”*

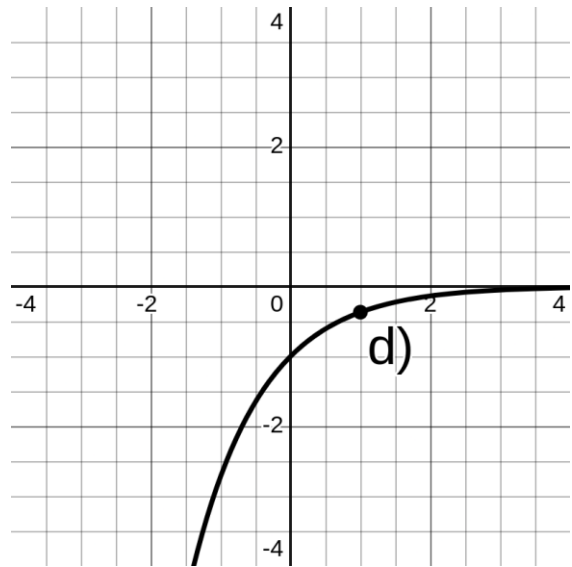
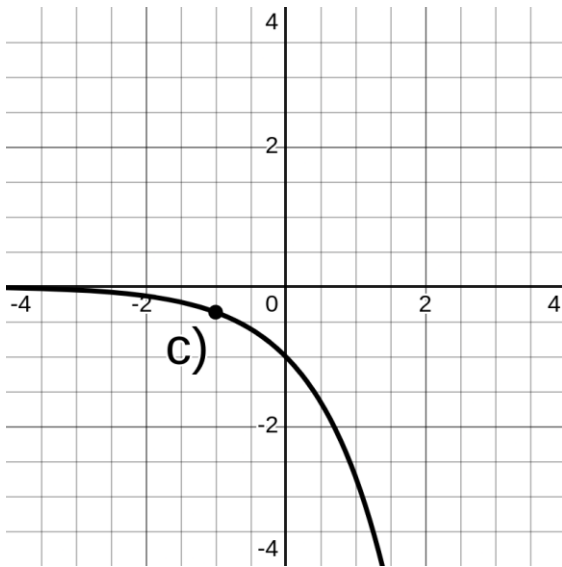
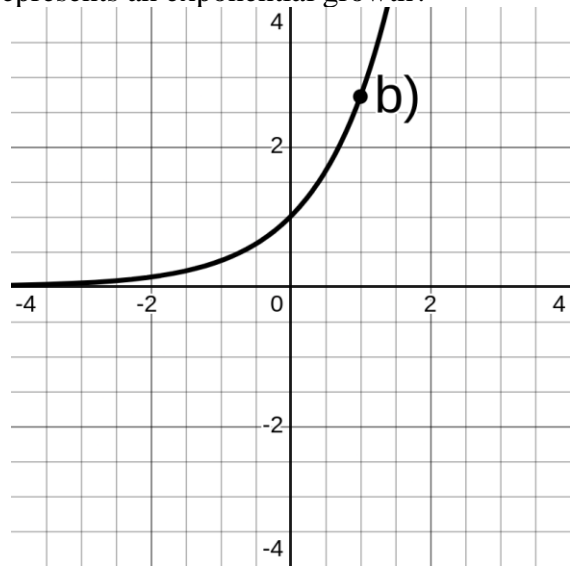
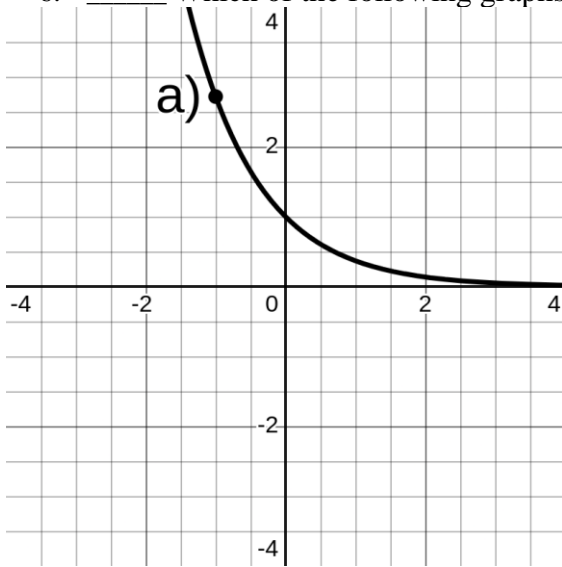
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Signature

I. Read the following questions and identify the option that best answers each, then write its letter on the line. (5 points each)

1. \_\_\_\_\_ The range of the function  $f(x) = e^{x-4} - 2$  is:  
a)  $f(x) \in (-4, \infty)$     b)  $f(x) \in (-2, \infty)$     c)  $f(x) \in [-2, \infty)$     d)  $f(x) \in (2, \infty)$
2. \_\_\_\_\_ The graph of the function  $f(x) = -2^x$  when  $x$  goes to infinity ( $x \rightarrow \infty$ ):  
a) The function goes to minus infinity ( $f(x) \rightarrow -\infty$ )  
b) The function goes to plus infinity ( $f(x) \rightarrow \infty$ )  
c) The function goes to zero ( $f(x) \rightarrow 0$ )  
d) The function goes to two ( $f(x) \rightarrow 2$ )
3. \_\_\_\_\_ Which of the following equations shows a translation of 1 units right and 2 units upwards from the parent function  $\ln(x)$  and tends to minus infinity ( $f(x) \rightarrow -\infty$ ) when the domain tends to one ( $x \rightarrow 1$ ).  
a)  $f(x) = \log_e(x + 2) - 1$     b)  $f(x) = \ln(x - 1) + 2$   
c)  $f(x) = -\ln(x - 1) + 2$     d)  $f(x) = \ln(x + 1) - 2$
4. \_\_\_\_\_ Which of the following statements represents the “Logarithm of a Product” property?  
a)  $\log_a(M) + \log_a(N) = \log_a(MN)$     b)  $\log_a(M) - \log_a(N) = \log_a\left(\frac{M}{N}\right)$   
c)  $(P)[\log_a(M)] = \log_a(M^P)$     d)  $-\log_a(M) = \log_a\left(\frac{1}{M}\right)$
5. \_\_\_\_\_ The domain of the function  $f(x) = \log_3(x + 2) - 4$  is:  
a)  $x \in (4, \infty)$     b)  $x \in (-4, \infty)$     c)  $x \in (2, \infty)$     d)  $x \in (-2, \infty)$

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6. \_\_\_\_\_ Which of the following graphs represents an exponential growth?



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II. Answer the following exercises. Frame or highlight your final answers.

7. Solved the following expressions for  $x$ . Include your procedures in an external paper (5 points each)

Expression	$\log_2 \left( \frac{x}{2} \right) = 3$
Procedure	
Answer	

Expression	$e^{2x} = 2$
Procedure	
Answer	

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III. Solve the following exercises in an orderly and clear manner. Underline or frame your final answer. Include the WHOLE procedure. This is evidence for your answers, **missing procedures will render the answer invalid.**

8. **Write and use the change of base formula** to compute the following. Report the numeric value with 6 decimals. (5 points)

Expression	$\log_9 \left( \frac{1}{9} \right)$
Procedure	
Answer	

9. Use the Laws of logarithms to expand the following expression. (10 points)

Expression	$\log \left( \frac{xy^3}{z^2} \right)$
Procedure	
Answer	

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10. Use the properties of logarithms to condense the following expression. (15 points)

Expression	$\log \left[ \frac{\ln(x^2)}{4 \ln(x)} - 2 \ln(x) \right]$
Procedure	
Answer	

11. Determine the horizontal asymptote for the following function. (10 points)

Expression	$f(x) = \frac{1}{2}(e^x - 2)^2$
Procedure	
Answer	

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12. Finde the critical points of the following functions. (10 points)

Expression	$f(x) = \exp[(x - 4)^2]$	$g(x) = \ln \left[ \frac{3}{2}x \right]$
Procedure		
Answer		

13. Sketch a graph of  $f(x) = e^x$  and  $g(x) = \ln(x)$ (10 points)

