Name: _____

SECONDARY MATH III HONORS
Module 2 study guide
Logarithmic functions and equations

NO CALCULATOR

1. Below you are given five different logarithmic expressions. Put these expressions in numerical order from smallest to largest by writing the *letter* that corresponds with each expression in the spaces below.

(A) $\log_2 900$ (B) $\log_9 9$ (C) $\log_2 0.02$ (D) $\log_8 1$ (E) $\log_3 27$

_____ _____ _____ _____ _____

Smallest ⟶ Largest

$\ln e = \log_e e = 1$

Evaluate the following logarithms.

2. $\log 10{,}000$

3. $\log_3 \frac{1}{9}$

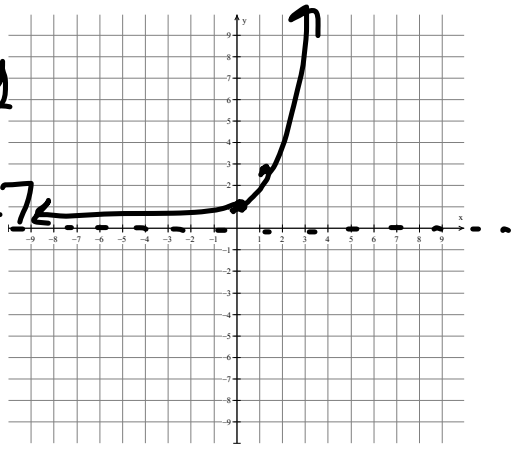
4. $\ln e^{12}$

$12 \cdot 1$

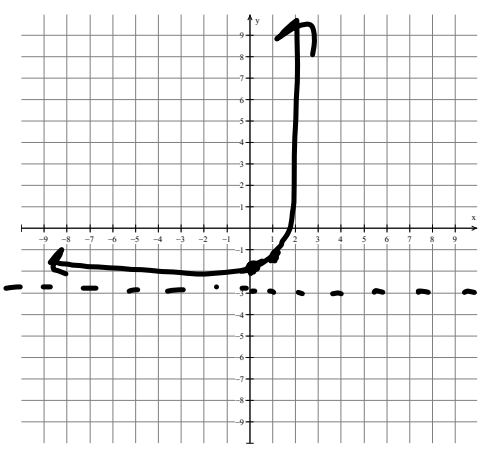
Graph the following functions. <u>Mark and label at least two points on each graph</u>.

5. $f(x) = e^x$

x	y
0	1
1	2.7



6. $f(x) = e^x - 3$ ↓3



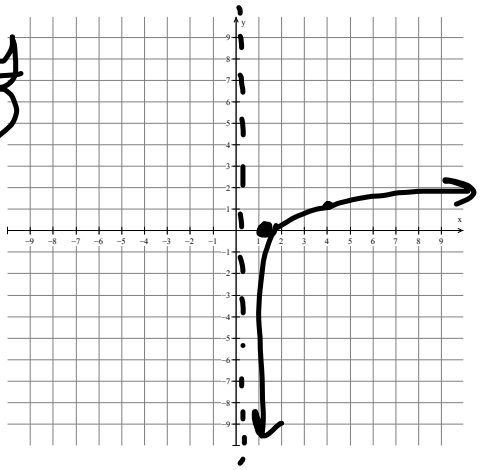
e^{x-3} → 3

e^{x+3} ← 3

$e^x + 3$ ↑3

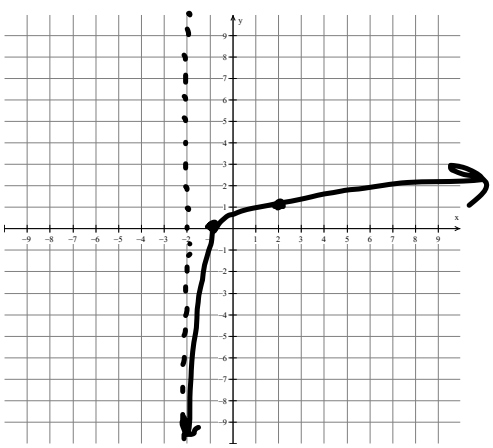
7. $f(x) = \log_4 x$

x	y
1	0
4	1



8. $f(x) = \log_4(x+2)$

← 2



Use properties of logarithms to expand each expression completely.

9. $\log_7(5x^2)$ =

$\log_7 5 + \log_7 x^2 =$

$\log_7 5 + 2\log_7 x$

10. $\log_2\left(\frac{3a}{5}\right) = \log_2 3a - \log_2 5 =$

$\log_2 3 + \log_2 a - \log_2 5$

Use $\log_4 5 \approx 1.2$ ***and*** $\log_4 3 \approx 0.8$***, along with properties of logarithms, to evaluate the following. Show all of your steps.***

11. $\log_4 25$

12. $\log_4 \frac{1}{3}$

13. $\log_4 \frac{36}{5}$

Find the domain, then solve the logarithmic equation. Show all of your work and discard any solutions that are not in the domain.

14. $\log_3(3x-2)-\log_3(x)=6$

Domain:

Solve:

15. $\dfrac{\log_2(5x-1)}{\log_2(3x-3)}=1$

Domain:

Solve:

CALCULATOR ALLOWED

Solve the exponential equation using one of the strategies learned in class. Show all of your work. Round any decimal answers to the nearest tenth.

16. $3^{4x}=\left(\dfrac{1}{9}\right)^{2x-8}$

17. $28=7\cdot 6^{3x}$

19. A population of Pacific white-sided dolphins grows at a rate of 1.7% per year. Currently there are 143 dolphins in the population.

a) Write an exponential growth formula specific to this situation.

b) How many dolphins will there be in the population after 10 years?

c) After how many years will there be 250 dolphins?