**Precalculus Unit 4 Notes—Evaluating using Properties of Logarithms**

* Logarithmic functions are inverses

of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ functions.



**Ex1)** Describe how to transform the graph of *y* = *ln* *x* **or** *y* = log *x* into the graph of the given function.

Then sketch the given function.

**(a)** *g*(*x*) = *ln* (*x* + 2) **(b)** *h*(*x*) = *ln* (3 – *x*) **(c)** *g*(*x*) = 3 *log* *x* **(d)** *h*(*x*) = 1 + *log* *x*

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***CHANGING BETWEEN EXPONENTIAL & LOGARITHMIC FORM***

If *x* > 0, *b* > 0, & *b* ≠ 1, then *y* = *log b x* if and only if *x* = *b y*

**Ex2)** Write each of the following in logarithmic or exponential form:

**Log Form** **Exp Form** **Exp Form** **Log Form**

a) *log* 2 8 = 3 🡪 \_\_\_\_\_\_\_\_\_\_ e) 52 = 25 🡪 \_\_\_\_\_\_\_\_\_\_

b) *log* 27 3 = ⅓ 🡪 \_\_\_\_\_\_\_\_\_\_ f) 9½ = 3 🡪 \_\_\_\_\_\_\_\_\_\_

c) *log* ½ 16 = –4 🡪 \_\_\_\_\_\_\_\_\_\_ g) (¼)–3= 64 🡪 \_\_\_\_\_\_\_\_\_\_

d) *log* 25 125 =  🡪 \_\_\_\_\_\_\_\_\_\_ h) 64–1**/**6 = ½ 🡪 \_\_\_\_\_\_\_\_\_\_

* Logarithms with base 10 are called \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ logs & are written without a base.
* Logarithms with base e are called \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ logs & are written with “LN” instead of log

 **Ex3)** Evaluate each of the following logs:

 **(a)**  **(b)**  **(c)** 

**(d)**  **(e)**  **(f)** 

**(g)**  **(h)** 

When in this form log b x ASK YOURSELF “b to what power equals x”

**Ex4)** Evaluate each of the following:

**(a)** log 100 = \_\_\_\_\_\_\_\_\_\_\_ **(b)** log  = \_\_\_\_\_\_\_\_\_\_\_\_ **(c)** log  = \_\_\_\_\_\_\_\_\_ **(d)** 10log 6 = \_\_\_\_\_\_\_\_\_

**Ex5)** Solve the simple logarithmic equations below by changing them to exponential form:

**(a)** log *x* = 3 **(b)** log 2 *x* = 5

**Ex6)** Evaluate each of the following:

**(a)** *ln*  = \_\_\_\_\_ **(b)** *ln e*5 = \_\_\_\_\_ **(c)** *e ln* 4 = \_\_\_\_\_

**Ex7)** Expand each of the following:



**(a)**  *log* (8*xy*4) **(b)** *ln* 

**(a)** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**(b)**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Ex8)** Condense the following logarithmic expression: *ln x*5 – 2 *ln* (*xy*) = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Ex9)** Given that *ln* 5 = *a* & *ln* 7 = *b* determine each of the following:

**a)** *ln* 35 = \_\_\_\_\_ **b)** *ln* (5/7) = \_\_\_\_\_\_ **c)** *ln* 175 = \_\_\_\_\_\_ **d)** *log* 57 = \_\_\_\_\_\_ **e)** *log* 735 = \_\_\_\_\_\_ **f)** *log* 5175 = \_\_\_\_\_