MATH 30 - Precalculus. Homework 8. Due Tu. 04/18/2019. Professor Luis Fernández

NAME:_____

Write your answers in this sheet and in other sheets. Do your graphs in the axes provided or in graph paper. Please **STAPLE this one to your other sheets** if any.

1. Use the properties of logarithms to expand the following expressions.

   a) $\log_9(5y) =$

   b) $\log_8 x^7 =$

   c) $\log_b(3x^2 y^3) =$

   d) $\log_8 \dfrac{x^{\frac{1}{2}}}{y^3} =$

   e) $\log_5 \sqrt[5]{\dfrac{x^2}{y}} =$

   f) $\log_5 \sqrt[7]{\dfrac{\sqrt{x^3}}{\sqrt[4]{y^3}}} =$

   g) $\ln\left[\dfrac{x^4 \sqrt{x^2+3}}{(x+3)^5}\right] =$

   h) $\log\left[\dfrac{10x^2 \sqrt[3]{1-x}}{7(x+1)^2}\right] =$

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2. Use the properties of logarithms to condense the following expressions.

   a) $\log x + \log 5 =$

   b) $\log_8 x + 3\log_8 y =$

   c) $4\ln(x+6) - 5\ln(x+1) =$

   d) $2\log x + 3\log y - 4\log z =$

   e) $\frac{1}{2}(\log x + \log y) =$

   f) $\frac{1}{3}(\log_7 x + 4\log_7 y) - 3\log_7(x+y) =$

   g) $\frac{1}{3}(5\ln(x+6) - \ln x - \ln(x^2-25)) =$

   h) $\log x + \log(x^2-4) - \log 15 - \log(x+3) =$

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3. Use the change of base formula to write the following logarithms as logarithms in the indicated base.

   a) $\log_7 12$; write it in base 10.

   b) $\log_9 127$; write it in base e.

   c) $\log_{25} 9$; write it in base 5 and simplify.

   d) $\log_{\frac{1}{2}} 8$; write it in base 2 and simplify.

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4. If $\log_2 b = \pi$, use the change of base formula to find $\log_b 8 =$.

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5. Solve the following equations.

   a) $4^x = 32$.

   b) $27^x = 81$.

   c) $2^{2x-1} = 32$

   d) $5^{2-x} = \dfrac{1}{125}$

   e) $7^{\frac{x-2}{6}} = \sqrt{7}$.

   f) $8^{1-x} = 4^{x+2}$

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6. Solve each exponential equation. Express each solution using natural logarithms (i.e. in base e) or logarithms in base 10. Then use a calculator to find a decimal approximation, correct to two decimal places.

   a) $5e^x = 7$

   b) $4e^{7x} = 10,273$

   c) $3^{\frac{x}{7}} = 0.2$

   d) $7^{2x-1} = 3^{x+2}$

   e) $e^{2x} - 2e^x - 3 = 0$

   f) $2^{2x} + 2^x - 12 = 0$

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7. Solve the following logarithmic equations.

   a) $\log_5 x = 3$

   b) $\log_4(x-7) = 3$

   c) $5\ln 2x = 20$

   d) $\log_5 x + \log_5 3 = 2$

   e) $2\log_5 x = 4$

   f) $3\log x = \log 125$

   g) $\log_2 \sqrt{x+4} = 1$

   h) $\log_2(x-1) + \log_2(x+1) = 3$

   i) $\log(x+7) - \log 3 = \log(7x-1)$

   j) $\log(x+3) + \log(x-2) = \log 14$

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8. Do exercises 17, 19, 21, 23 from **Section 4.5** in the book.