MATH 30 - Precalculus, Practice Midterm 2

Second Midterm. Time allowed: 2 hours, 15 minutes.   Professor Luis Fernández

NAME: _____

Instructions:

- Write all your answers in the space provided, or attach sheets if you need more space.
- **SHOW ALL YOUR WORK**. Solutions without work shown will receive no credit.
- Non-graphing calculators are allowed. No notes or books allowed.
- The exam has 8 exercises. The points of each exercise are written on the left.
- The exam has a total of 110 points, with 10 extra credit points.

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[18] **1.** Write the **exact value (NO decimals)** of

a) $\log_4 64 =$

b) $\log_6 \sqrt[3]{6} =$

c) $\log_{123} 123^7 =$

d) $2013^{\log_{2013} 6} =$

e) $\log_9 \dfrac{1}{27} =$

f) $\log_{16} 8 =$

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[6] **2.** Convert the following from exponential form to logarithmic form.

a) $e^x = 2$

b) $10^{x-2} = 7$

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[6] **3.** Convert the following from logarithmic form to exponential form.

a) $\operatorname{Ln} y = 3$

b) $\log_3(y + 6) = x + 4$

[8] **4.** Condense the following logarithmic expressions (that is, write them using only one logarithm in the front).

a) $5 \log x + 2 \log y$

b) $7 \log a + 2 \log b - 7 \log c$

c) $\frac{1}{5}(2 \log x - \frac{1}{2} \log y + \frac{2}{3} \log z)$

d) $\frac{\log x}{5} - \frac{4}{7} \log y$

[8] **5.** Expand the following logarithmic expressions (that is, write them using addition and subtraction of logarithms).

a) $\log_5 (4yz)$

b) $\log_7 (x^2 y^4)$

c) $\log_9 \left(\frac{x^{14}}{4}\right)$

d) $\log (x^4 y^3)^5$

[4] **6.** Write the following logarithms in the indicated base.

a) $\log_5 7$, in base 6.

b) $\log_2 9$, in base 10.

[40] **7.** Solve the following equations. If the answer is not an exact numbers, leave it expressed as a logarithm.

a) $7^{x-2} = 49$

b) $4^{x-3} = 8^{2x+1}$

c) $\log_2(x) - 4 = \log_2 3$

d) $\log_3(x-4) + \log_3(x-2) = \log_3(2x-7)$

[20] **8.**   For the rational function $f(x) = \dfrac{x^2 + 2x - 3}{x^2 - 2x - 3}$,

   a) Factor numerator and denominator.

   b) Find the x intercepts of the graph of $y = f(x)$, if there are any.

   c) Find the y intercept of the graph of $y = f(x)$, if there is any.

   d) Find any vertical asymptotes. Remember to write the equation of the asymptote.

   e) Find any horizontal asymptotes. Remember to write the equation of the asymptote.

   f) Use the information above
   to sketch a graph of $y = f(x)$.

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