MATH 30 - Precalculus, Version A

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) $\log_3 81 =$

b) $\log_5 \sqrt[4]{5} =$

c) $1023^{\log_{1023} 5} =$

d) $\log_{4513} 4513^{13} =$

e) $\log_{16} 8 =$

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

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

a) $e^x = 8$

b) $10^{x+3} = 16$

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

a) $\text{Ln } y = 8$

b) $\log_6(y + 8) = x + 3$

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

    a) $4 \log x + 3 \log y$ **b)** $12 \log a - 2 \log b + 5 \log c$

    c) $\dfrac{1}{5}\left(2 \log x - \dfrac{1}{2} \log y + \dfrac{2}{3} \log z\right)$ **d)** $\dfrac{\log x}{7} - \dfrac{3}{5} \log y$

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

    a) $\log_5 (5xy)$ **b)** $\log_7 \left(x^5 y^2\right)$

    c) $\log_8 \left(\dfrac{x^{12}}{7}\right)$ **d)** $\log \left(x^4 y^3\right)^5$

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

    a) $\log_5 7$, in base 2.   **b)** $\log_7 5$, in base 10.

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

a) $7^{x+4} = 49$

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

c) $\log_2(x) - 3 = \log_2 5$

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 and simplify if possible.

b) Find the x intercepts of the graph of $y = f(x)$, if they exist.

c) Find the y intercepts of the graph of $y = f(x)$, if they exist.

d) Find any vertical asymptotes.

e) Find any horizontal asymptotes.

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