Pre-Calculus Homework #7

1) Ronnie wants to build a fence around part of his backyard so that his dog can go outside without running away. Ronnie has 340 feet of fence and will build a free-standing, rectangular enclosure for his dog. Use completing the square to determine the dimensions (length and width) of the enclosure in order to maximize the area AND determine how much area this new fence provides for his dog.

2) Adam leaves the church at 4pm and drives his car due west at a rate of 48 mph. Abigail leaves the church at noon and drives her car due north at a rate of 63 mph. What time of day will it be when they are exactly 390 miles away from each other?

3) Use Descartes' rule of signs to determine the nature of the roots for the function $f(x) = 4x^6 + 8x^5 - 5x^4 - 7x^3 + 9x^2 - 6x - 2$ and then use this information, along with your knowledge of end behavior, to make an approximate graph for each possible scenario.

4) Find the equations for all of the vertical, horizontal, and oblique asymptotes for the function $f(x) = \dfrac{-5x^4 + 4x^3 - 9x^2 - 2x + 8}{x^3 - 6x^2 - 9x + 54}$

5) List all of the possible rational zeros, find all of the rational, irrational, or imaginary zeros if $f(x) = 0$, then factor $f(x)$ and then use this information, along with your knowledge of end behavior, to make an approximate graph for the function if $f(x) = 2x^5 - 3x^4 + 7x^3 - 21x^2 - 99x + 54$

6) Simplify $81^{\frac{3}{4}}$, $\log_7 343$, $64^{\frac{5}{6}}$, and $\log .0001$

7) Simplify $5\log_4 m + 9\log_4 a - 3\log_4 x$

8) Graph $f(x) = 2^{-x-3} - 5$ and state the domain and range.

9) Solve $243^{5x} = 81^{2x-3}$ exactly and then approximate the answer rounded to three decimal places.

10) Expand $\log_7 \sqrt[8]{\dfrac{k^6 m}{y^{24}}}$

11) Graph $f(x) = -(\dfrac{1}{2})^{x+5} + 7$ and state the domain and range.

12) Solve $7^{4x-1} = 14$ exactly and then approximate the answer rounded to three decimal places.

13) Simplify $\ln e^{8x-7}$

14) Graph $f(x) = e^{-2x+3} - 4$ and state the domain and range.

15) Solve $512^{3x-4} = (\dfrac{1}{64})^{2x+3}$ exactly and then approximate the answer rounded to three decimal places.

16) Simplify $\dfrac{4}{7}\log_3 y - 6\log_3 a - 8\log_3 x$

17) Graph $f(x) = -\ln(x+8) - 3$ and state the domain and range.

18) Solve $18^{4x-5} = 36^{6x+1}$ exactly and then approximate the answer rounded to three decimal places.

19) Simplify $8\log_9 x - 4(3\log_9 c - 7\log_9 y)$

20) Expand $\ln(\dfrac{m^2}{a^7 x^6})^3$