NOTE: The actual exam will only have 13 questions. The different parts of each question (part A, B, etc.) are variations. Know how to do all the variations on this exam.

1A.) (4 pts) Find the asymptotes. DO NOT GRAPH:

Vertical: ________________

Slant: ________________

1B.) (4 pts) Find the asymptotes. DO NOT GRAPH:

Vertical: ________________

Slant: ________________

2A.) (6 pts) Use the following equation to answer the below questions: \( y = \frac{x - 2}{x^2 - 2x - 3} \).

i.) Find the intercepts.

x-int: ________________

y-int: ________________
ii.) Find the asymptotes.

Vertical: _______________

Horizontal: _______________

iii. Graph.

2B.) (6 pts) Use the following equation to answer the below questions: \( y = \frac{x(x + 4)}{x^2 + 4x + 3} \).

i.) Find the intercepts.

x-int: _______________

y-int: _______________

ii.) Find the asymptotes.

Vertical: _______________

Horizontal: _______________

iii. Graph.
3A.) (5 pts) Graph using transformations: \( y = -3^{x-2} + 3 \). Start with the base graph \( y = 3^x \) and then graph each successive transformation. The final graph will be your graph of \( y = -3^{x-2} + 3 \).

![Base Graph](image1)

![Final Graph](image2)

3B.) (5 pts) Graph using transformations: \( y = 2^{1-x} - 4 \). Start with the base graph \( y = 2^x \) and then graph each successive transformation. The final graph will be your graph of \( y = 2^{1-x} - 4 \).

![Base Graph](image3)

![Final Graph](image4)

4A.) (4 pts) Solve for \( x \): \( \left( 2^{2x} \cdot 2^{2x} \right)^{y-1} = 8 \)

4A._____________________

4B.) (4 pts) Solve for \( a \): \( a^{a^2-4} = 6 \)

4B._____________________
4B.) (4 pts) Solve for x: \( \left( \frac{3^7 x}{3^{4 x}} \right)^{x-1} = 729 \)

\[ 4B. \underline{\text{____________________}} \]

5A.) (6 pts) Graph using transformations: \( y = -\ln(x + 4) \). Start with the base graph \( y = \ln x \) and then graph each successive transformation. The final graph will be your graph of \( y = -\ln(x + 4) \). Indicate the domain and vertical asymptote of your final graph.

Base Graph

- x-intercept: \underline{___________________}
- Domain: \underline{__________________}
- Vertical Asymptote: \underline{__________________}

Final Graph

5B.) (6 pts) Graph using transformations: \( y = \log_2 (3 - x) \). Start with the base graph \( y = \log_2 x \) and then graph each successive transformation. The final graph will be your graph of \( y = \log_2 (3 - x) \). Indicate the domain and vertical asymptote of your final graph.

Base Graph

- x-intercept: \underline{___________________}
- Domain: \underline{__________________}
- Vertical Asymptote: \underline{__________________}

Final Graph
6A.) (5 pts) Use properties of logarithms to expand the logarithmic expression as much as possible. Express powers as factors. Where possible, evaluate logarithmic expressions.

$$\log_4 \left[ \frac{(x - 4) \cdot \sqrt[3]{2x - 3}}{4\sqrt[4]{4x - 7}} \right]$$

6B.) (5 pts) Use properties of logarithms to expand the logarithmic expression as much as possible. Express powers as factors. Where possible, evaluate logarithmic expressions.

$$\ln \left[ \frac{(e) \cdot (x - 2)^3}{x \cdot \sqrt[4]{4 - x}} \right]$$

7A.) (4 pts) Use properties of logarithms to condense the logarithmic expression. Write the expression as a single logarithm whose coefficient is 1. Fully simplify your answer:

$$\log_2 (x - 6) + \log_2 5 - \log_2 (2x^3 - 12x^2)$$
7B.) (4 pts) Use properties of logarithms to condense the logarithmic expression. Write the expression as a single logarithm whose coefficient is 1. Fully simplify your answer:
\[
\log(x^2 + 3x + 2) - 2 \log(x + 1)
\]

8A.) (5 pts) Solve:
\[
\log_2(x - 6) + \log_2(x - 4) - \log_2 x = 2
\]

8B.) (5 pts) Solve:
\[
\ln x + \ln(x - 2) - \ln(x + 4) = 0
\]
9A.) (4 pts) Solve for \( x \): \( 3^{x-5} = 2^{4-x} \). You may write your answer in terms of logarithms. 

9B.) (4 pts) Solve for \( x \): \( 5^{-x} = 4^{x+3} \). You may write your answer in terms of logarithms.

10A.) (4 pts) Sodium-24, an isotope, has a half-life of 15 hours. How much of a 7 gram sample remains after 11 hours?
10B. (4 pts) An alien radioactive isotope has a half-life of 238 years. How much of a 8 kilogram sample remains after 100 years?

11A. (4 pts) Which of the following options results in more interest? (Answer A or B)
A: $1000 invested at 8% compounded semianually for 3 years
B: $1000 invested at 7.9% compounded continuously for 3 years

11B. (4 pts) Which of the following options results in more interest? (Answer A or B)
A: $50 invested at 6% compounded monthly for 3 years
B: $50 invested at 5.9% compounded continuously for 3 years
12A.) (5 pts) Las Vegas began with 2 Dunkin Donuts stores. It is estimated that 2.25 years later there will be 14 stores.

   i.) Find the exponential growth function that describes the given information.

   ii.) How many stores are estimated to be in Las Vegas after 3.5 years? (Round to the nearest whole number)

12B.) (5 pts) An insect population began with 500 insects. After 23.5 days the population reached 800 insects.

   i.) Find the exponential growth function that describes the given information.
ii.) What is the insect population after 10 days? (Round to the nearest whole number)

ii. ______________________

13A.) (4 pts) Solve the system:
\[
\begin{align*}
    x^2 + y^2 &= 1 \\
    y &= x^2 - 1
\end{align*}
\]
Write your answer as coordinates.

13B.) (4 pts) Solve the system:
\[
\begin{align*}
    x^2 + 2y^2 &= 9 \\
    4x^2 - y^2 &= 0
\end{align*}
\]
Write your answer as coordinates.
# MATH 126 TEST 3 REVIEW PROBLEMS

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Test will be closed-book and no note cards will be allowed. The exam will consist of problems similar to the ones on this sample test and the above list of review problems.