

NAME: \_\_\_\_\_

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# MATH 126 TEST 3 SAMPLE

**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:

$$y = \frac{6x^2 - 17x + 5}{2x - 3}$$

Vertical: \_\_\_\_\_

Horizontal: \_\_\_\_\_

Oblique: \_\_\_\_\_

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

$$y = \frac{4x^2 - 7}{2x - 1}$$

Vertical: \_\_\_\_\_

Horizontal: \_\_\_\_\_

Oblique: \_\_\_\_\_

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: \_\_\_\_\_

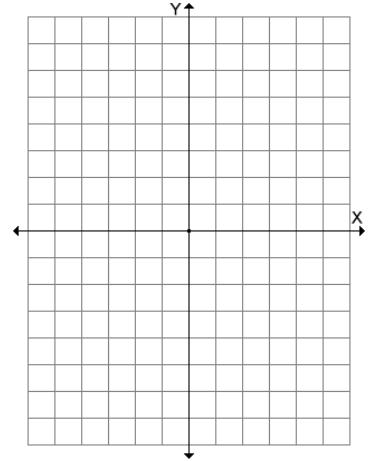
y-int: \_\_\_\_\_

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: \_\_\_\_\_

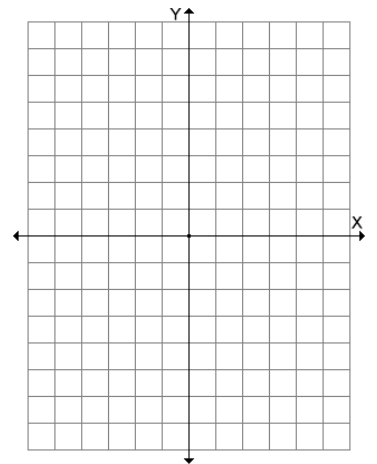
y-int: \_\_\_\_\_

ii.) Find the asymptotes.

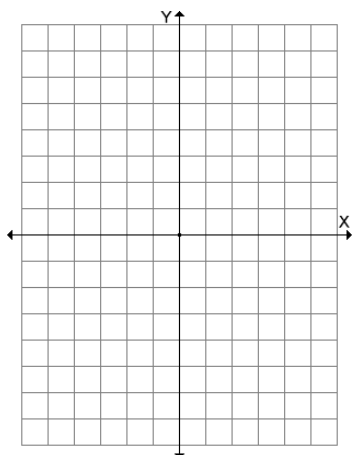
Vertical: \_\_\_\_\_

Horizontal: \_\_\_\_\_

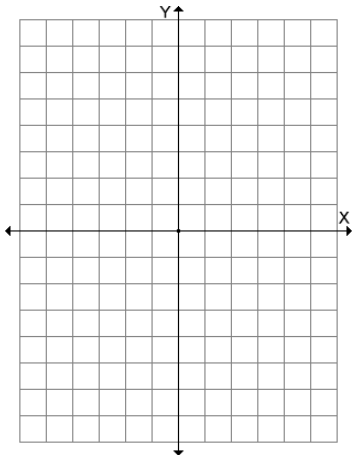
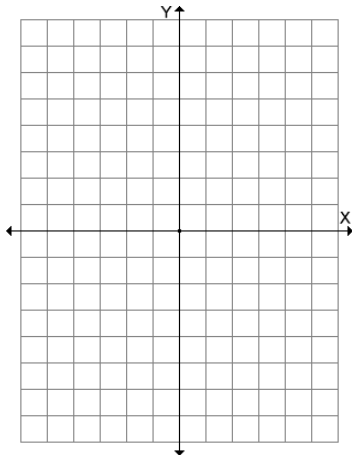
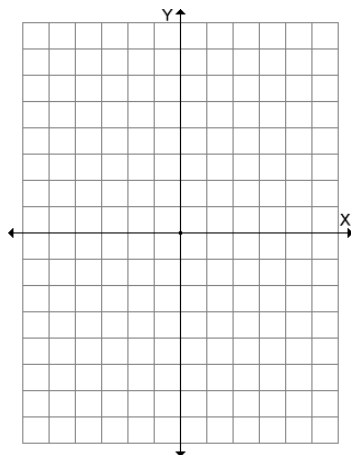
iii. Graph.



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  $y = -3^{x-2} + 3$ .

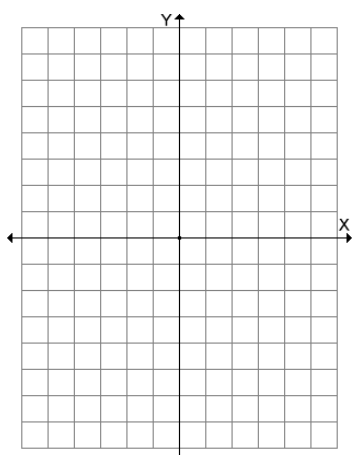


Base Graph

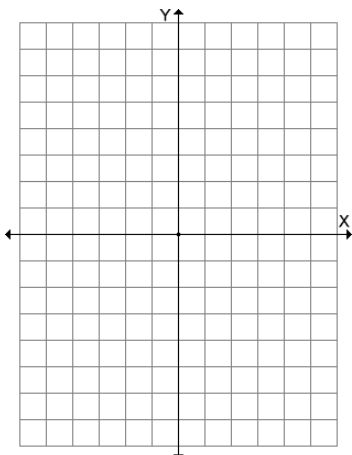
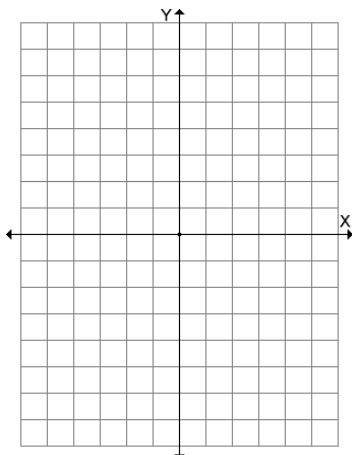
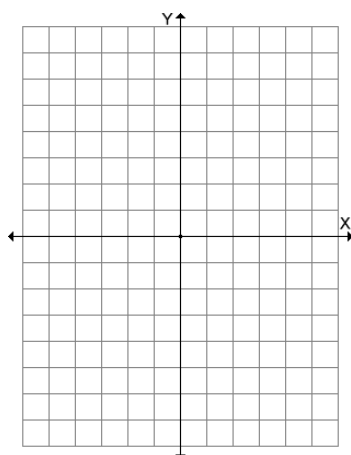


Final Graph

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



Final Graph

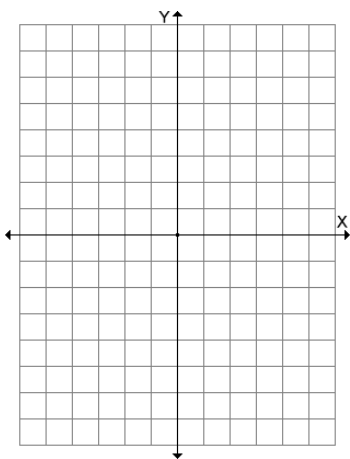
4A.) (4 pts) Solve for x:  $(2^{2x} \cdot 2^{2x})^{x-1} = 8$

4A. \_\_\_\_\_

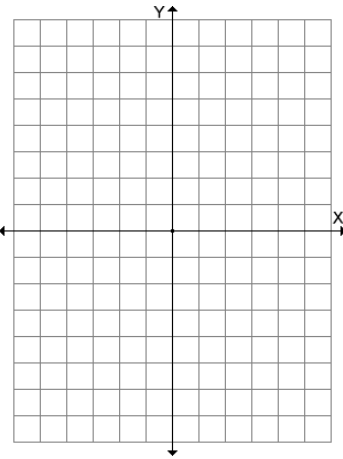
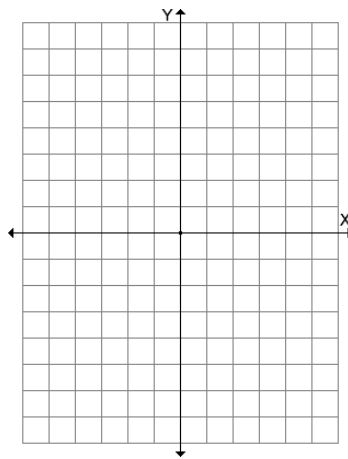
4B.) (4 pts) Solve for x:  $\left(\frac{3^{7x}}{3^{4x}}\right)^{x-1} = 729$

4B. \_\_\_\_\_

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.



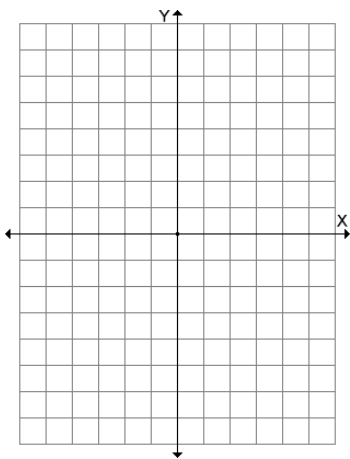
Base Graph



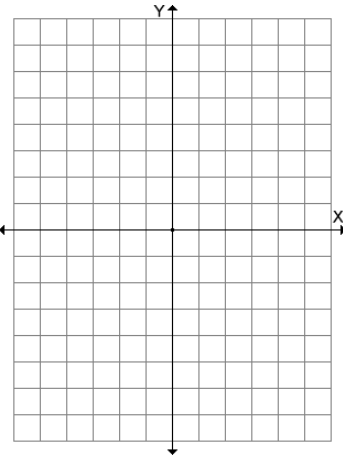
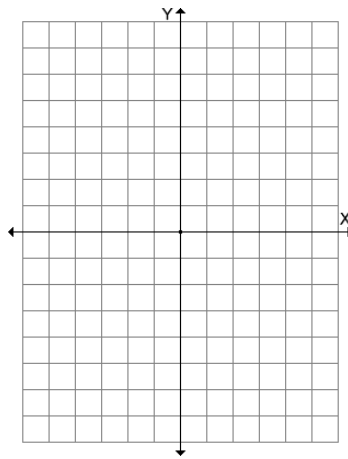
Final Graph

Domain: \_\_\_\_\_

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



Final Graph

Domain: \_\_\_\_\_

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.

$$\log_4 \left[ \frac{(x-4) \cdot \sqrt[5]{2x-3}}{4\sqrt{4x-7}} \right]$$

6A. \_\_\_\_\_

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.

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

6B. \_\_\_\_\_

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

7A. \_\_\_\_\_

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

7B. \_\_\_\_\_

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

8A. \_\_\_\_\_

8B.) (5 pts) Solve:  $\ln x + \ln(x - 2) - \ln(x + 4) = 0$

8B. \_\_\_\_\_

9A.) (4 pts) Solve for  $x$ :  $3^{x-5} = 2^{4-x}$ . You may write your answer in terms of logarithms.

9A. \_\_\_\_\_

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

9B. \_\_\_\_\_

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?

10A. \_\_\_\_\_

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?

10B. \_\_\_\_\_

11A.) (4 pts) Which of the following options results in a higher amount?  
(Answer A or B)

11A. \_\_\_\_\_

A: \$1000 invested at 8% compounded seminannually for 3 years

B: \$1000 invested at 7.9% compounded continuously for 3 years

11B.) (4 pts) Which of the following options results in a higher amount?  
(Answer A or B)

11B. \_\_\_\_\_

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.

i. \_\_\_\_\_

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

ii. \_\_\_\_\_

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.

i. \_\_\_\_\_

ii.) What is the insect population after 10 days?  
(Round to the nearest whole number)

ii. \_\_\_\_\_

13A.) (4 pts) Solve the system:  $x^2 + y^2 = 1$   
 $y = x^2 - 1$ . Write your answer  
as coordinates.

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13B.) (4 pts) Solve the system:  $x^2 + 2y^2 = 9$   
 $4x^2 - y^2 = 0$ . Write your answer  
as coordinates.

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