MAC 1105   Sample Test 4   Name _____

1)   Let $f(x) = 5x - 2$. Find $f^{-1}(x)$ as a function of x.

$f^{-1}(x) = $ _____

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2)   Let $f(x) = x^3 - 3$ for $x \geq -1$

A)   Graph $y = f(x)$

B)   State the Domain of f

C)   State the Range of f

D)   Find $f^{-1}(x)$ as a function of x

$f^{-1}(x) = $ _____   for _____

E)   Graph $y = x$ and $y = f^{-1}(x)$ on the graph above.

F)   State the Domain of $f^{-1}(x)$

G)   State the Range of $f^{-1}(x)$

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3)   Use your calculator and the Change-of-Base Formula to evaluate the following logarithms:
     Round your answers to 2 decimal places.

A) $\log_3 52$ B) $\log 731$

4)   Expand the following logarithms to the Sum or Difference of Logarithms. Simplify Completely.

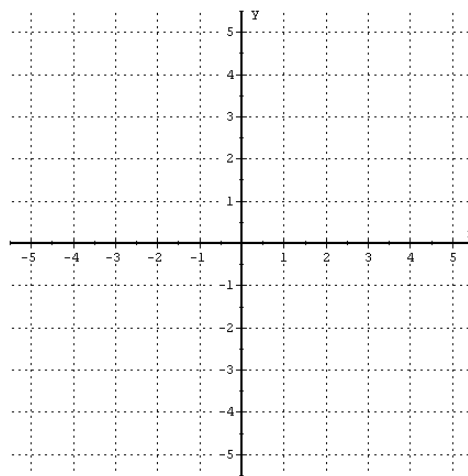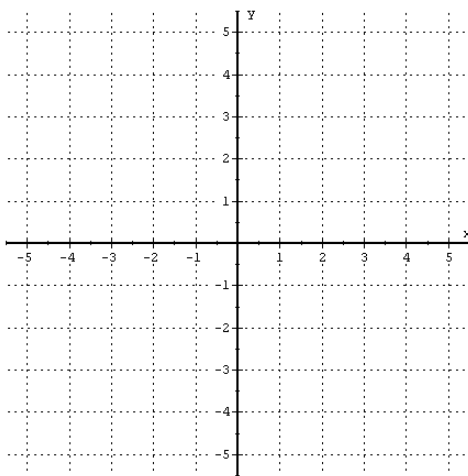A) $\log \dfrac{xy^2}{zw^3}$ B) $\ln \dfrac{x^3 \sqrt{x-2}}{x+4}$

5) Condense the following logarithmic expressions to a single logarithm. Simplify Completely.

A) $2\log x - \log y + 3\log z$

B) $\dfrac{1}{2}\log x - 5\log y - \dfrac{1}{3}\log z$

6) Graph $y = 2^{x+1} - 4$

7) Graph $y = \log_2(x + 3)$

Be sure to show all asymptotes with dotted lines on the graphs above

B) State the Domain

B) State the Domain

C) State the Range

C) State the Range

8) Suppose that you invest $50,000 in an account earning 6.5% annual interest. Find the balance in the account at the end of 8 years if your money is compounded: (Round answers to the nearest penny)

Use the Formula: $A = P\left(1 + \dfrac{r}{n}\right)^{(n\cdot t)}$ (Round answers to the nearest penny)

Compounded	Calculator Entry	Amount
Yearly		$
Monthly		$
Daily		$

9) The formula $D(t) = D_0 \, e^{-0.2t}$ can be used to find the number of milligrams (mg) D of a certain drug that is in a patient's bloodstream t hours after the drug has been administered where D_0 is the initial amount of the drug administered. Assume that 250 mg of the drug is administered initially.

A) How much of the drug is in the patient's bloodstream 5 hours after it was administered?
Round your answer to 2 decimal place.

B) When the amount of the drug in the patient's bloodstream reaches 75 mg, the drug needs to be re-administered. How long until the drug needs to be re-administered?
<u>Solve the equation by hand</u>. Round your answer to 1 decimal place.

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10) An Australian farmer released 24 rabbits into the wild. The population of rabbits increased at a rate of 19% per month. Approximately 72 months after their release, the rabbit population had increased to 22 million. When were there 1 million (1,000,000) rabbits? Solve by hand or use your calculator. Round your answer to 2 decimal places.

Use the Law of Uninhibited Exponential Growth Model: $P(t) = P_0 \, e^{kt}$

Solve the Following Equations by Hand. Show your work! Then use your calculator to evaluate your final answer - round your answer to 2 decimal places. You can <u>check</u> your answers using your graphing calculator - by using the CALC/intersect tool.

11) $\log_4(3x - 2) = 2$ 12) $3^x = 15$

13) $4^{x+5} = 8$ 14) $\log(5x - 2) = 3$

15) $\ln(3x) = 2$ 16) $8 = 2\,e^{0.5x}$

17) $\log(x) + \log(x - 3) = 1$ 18) $100 = 500\,e^{-0.3x}$