Precalculus Test #3 Name:_____

Gelsinger Fall 2009

Read each question carefully. You must show all of your work in order to receive full credit. Circle your final answer.

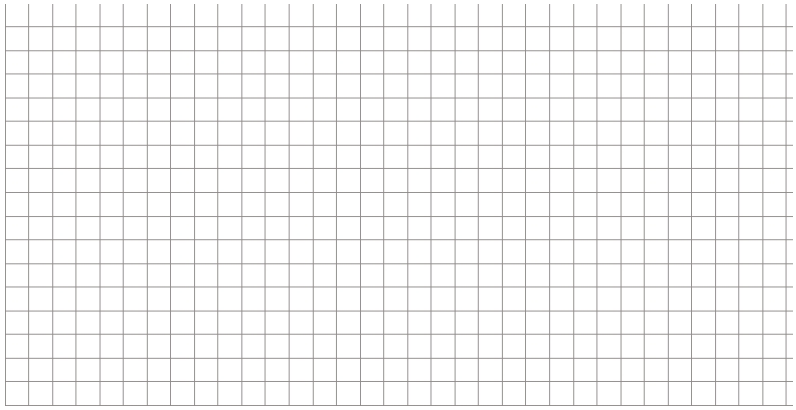
1. Determine whether the function is one-to-one, and if it is one-to-one, find a formula for its inverse.

a. $f(x) = 2x - 1$

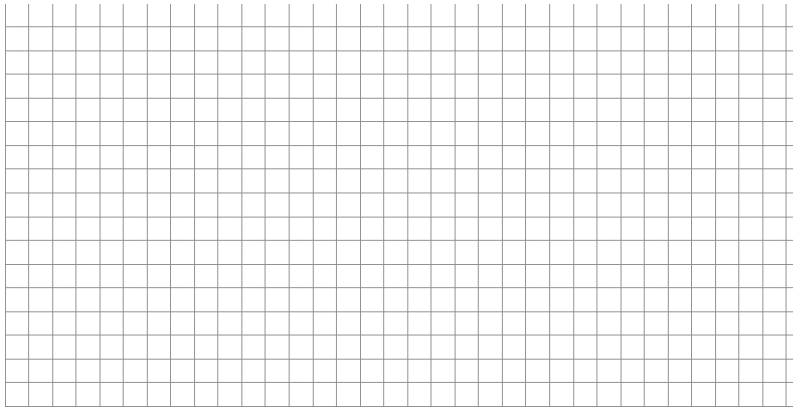
b. $f(x) = \frac{4}{x+7}$

2. Graph the function. Include labels for asymptotes and at least two reference points.

a. $f(x) = 2^{x+3} - 5$



b. $f(x) = log_3 x - 1$



3. Find each of the following without using a calculator. Show the intermediate steps that led to the answer. Give exact answers.

a. $log_2 \frac{1}{4}$

b. $\log \sqrt{10}$

c. $\ln \frac{1}{e^5}$

4. Find the logarithm using natural logs and the change-of-base formula. Give an exact answer in terms of logs and an approximate answer to four decimal places.

a. $log_3 12$

b. $log_{100} 15$

5. Express as a single logarithm.

a. $\frac{2}{3}[\ln(x^2 - 9) - \ln(x + 3)] + \ln(x + y)$

b. $\ln 2x + 3(\ln x - \ln y)$

6. Express in terms of sums and differences of logs.

a. $\log \sqrt{x^3 y}$

b. $\log_c \sqrt[3]{\frac{y^3 z^2}{x^4}}$

7.Given that $\log_b 2 \approx 0.693$, $\log_b 3 \approx 1.099$, and $\log_b 5 \approx 1.609$, find the following to the nearest thousandth.

a. $\log_b \frac{1}{6}$

b. $\log_b 30$

8. Simplify.

a. $5^{\log_5(4x-3)}$

b. $\log_b \sqrt{b^3}$

9. Solve for x. Find an exact answer algebraically.

a. $\log_2(x+1) + \log_2(x-1) = 3$

b. $5^{4x-7} = 125$

10. In 1984, the average cell phone price was $3395, and in 2002, it was $145. Assuming the average price of a cell phone decreased according to the exponential model,

a. Find the value of k, and write an exponential function that describes the average price of a cell phone after time t, in years, where t is the number of years since 1984.

b. Estimate the price of a cell phone in 2006 and 2008 to the nearest dollar.

c. At this decay rate, in what year will the price be $39?

Bonus: Solve for x.

$$(ax)^{\log_b a} = (cx)^{\log_b c}$$