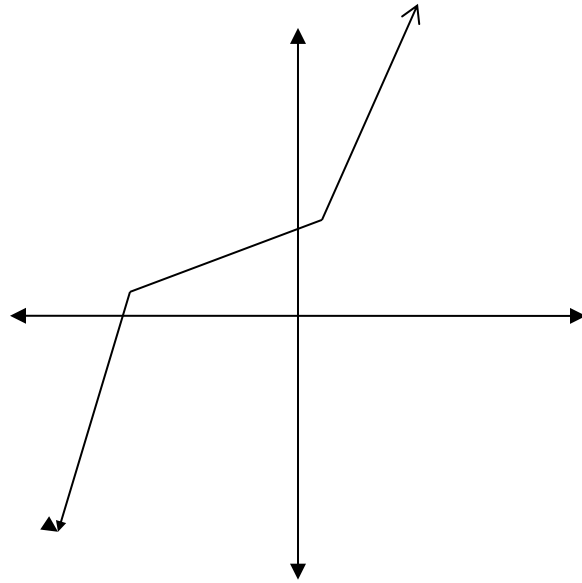


MAT 124 Sample Test Three

No problem on this list is on the test, but they all bear an uncanny resemblance to the problems that are. If you can do these, you can do the test. Always show your work.

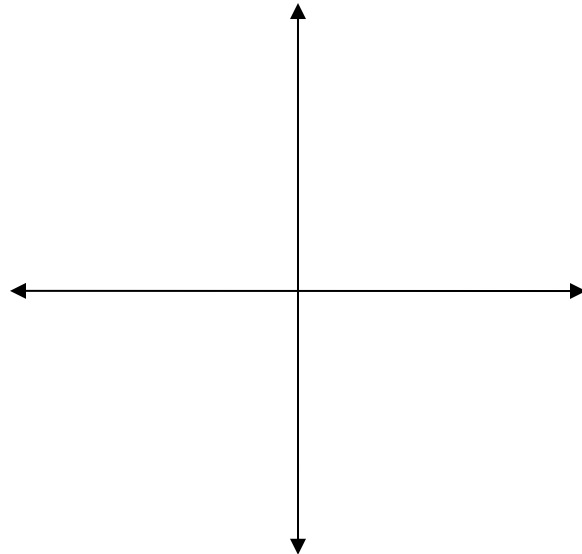
1. Is the function shown on the graph one to one? How do you know?



2. Show that $f(x)$ and $g(x)$ are inverses. $f(x) = x^5 - 3$ $g(x) = (x + 3)^{1/5}$

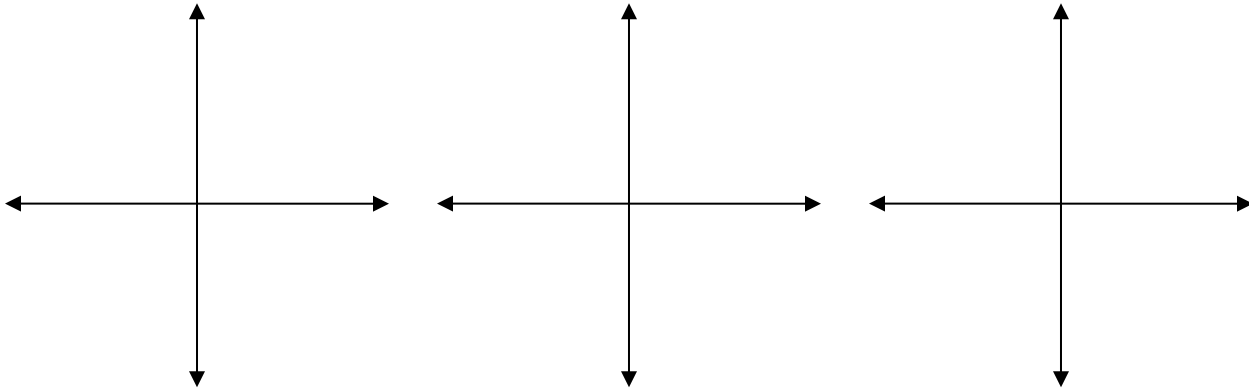
3. Find $f^{-1}(x)$ and give its domain. $f(x) = x^6 - 2$, $x \geq 0$.

4. Graph. $f(x) = 3^x$



5. Graph the function in steps, starting with the appropriate library function.

$$g(x) = 2^{x+1} + 2$$



6. The number of watts w provided by a space satellite's battery pack after a period of d days is given by the function $w(d) = 80 e^{-0.0015d}$. How much power will be available after 21 days?

7. The percentage of children in the population of the USA is modeled by the function $K(t) = 31.99(0.99)^t$, where t is the number of years since 1974. What percentage of the US population will be children in 2008?

8. Change to an equivalent equation using a logarithm $b^3 = 23$.

9. Use the change-of-base formula and a calculator to approximate (four decimal places) $y = \log_7 37$.

10. In chemistry, the pH of a substance is defined as $pH = -\log[H^+]$, where H^+ is the hydrogen ion concentration in moles per liter. Pineapple juice has a hydrogen ion concentration of $1.6(10^{-4})$; what is the pH of pineapple juice?

$$\log_7 \left(c^2 \sqrt{\frac{a^3}{b^5}} \right)$$

11. Write as the sum and/or difference of logarithms

12. Write as a single logarithm. $\ln 2x + 3(\ln y - \ln x)$

13. If $\log_b 3 \approx 3.1416$, approximate $\log_b 81$.

$$64^{3x} = \frac{1}{8}$$

14. Solve.

15. Solve. $2 \log_7 (x + 4) - \log_7 49 = 2$
16. Solve. $\log_4 (x^2 - 16) - \log_4 (x + 4) = 2.$
17. Express y as a function of x . $\log y = \log x - \log C, \quad C > 0$.
18. Suppose April has access to an investment that will pay 9% interest compounded continuously. Which is better: To be given \$4000 now to put in this investment, or be given \$5300 after three years?
19. The population $N(t)$ for bacteria in a particular experiment (t in hours) is represented by $N(t) = 4000 e^{0.03t}$. How long until the population is 9000?
20. Salt decomposes in water according to the law of uninhibited decay. If the initial amount of salt is 40 kg, and after 9 hours 33 kg of salt is left, how much of the salt will be left after one day?
21. If a pane of glass absorbs 12% of the light passing through it, then the percent P of light that passes through n successive panes is given by the approximation $P(n) = 100e^{-.12n}$. How many panes of glass are required to block at least 75% of the light?
22. How would you characterize the natural logarithm of -2 ? Why?