

Your test on chapter 5 will be in two parts: a non-calculator part and a calculator part. Please complete your review without a calculator when asked.

**Non-calculator Portion**

Tell whether the following are examples of exponential growth or decay.

1.  $f(x) = 4\left(\frac{3}{8}\right)^x$       2.  $f(x) = 3\left(\frac{4}{3}\right)^x$       3.  $f(x) = 6\left(\frac{2}{3}\right)^{-x}$       4.  $f(x) = e^{-2x}$

Evaluate the exact value of each of the following:

5.  $\log_9 3$       6.  $\log_7 7^{3x-4}$       7.  $\log_5 \frac{1}{25}$       8.  $\ln e^{-7}$

Rewrite the following in logarithmic form:

9.  $5^{-1} = \frac{1}{5}$       10.  $e^5 = a$       11.  $\left(\frac{1}{3}\right)^{-2} = 9$       12.  $8^{2/3} = 4$

Rewrite the following in exponential form:

13.  $\log_b 5 = 3$       14.  $\log_{16} 4 = \frac{1}{2}$       15.  $\ln 1 = 0$       16.  $\log .01 = -2$

Write each of the following as a sum, difference and/or multiple of logarithms.

17.  $\log[(x-2)(x+3)^2]$       18.  $\log_5\left(\frac{5x^2}{25y^3}\right)$       19.  $\ln\left(\frac{\sqrt{x-1}}{4x^3}\right)$

Write each of the following as the logarithm of a single quantity.

20.  $4\log_a 7x - 2\log_a y + \log_a 3w$       21.  $-3\log x + 2\log y - 3\log 4$
22.  $\frac{1}{2}\ln(x+1) - \frac{2}{3}\ln x - \ln 4$       23.  $6\log_b 2 + 5\log_b w - \frac{1}{2}(\log_b x + 4\log_b m)$

Find the range and domain of the following functions:

24.  $f(x) = -3^{x-1} - 2$

Domain:  
Range:

25.  $f(x) = \ln x - 1$

Domain:  
Range:

26.  $f(x) = 2\left(\frac{2}{3}\right)^{x+3} + 5$

Domain:  
Range:

27.  $f(x) = \log_2(x+3) - 4$

Domain:  
Range:

28.  $f(x) = 4^{2x+3} - 5$

Domain:  
Range:

29.  $f(x) = -\log(3x+2) + 4$

Domain:  
Range:

Make a table of values, carefully graph each of the following functions, and answer the accompanying questions:

30.  $f(x) = -3^{x+1} + 2$

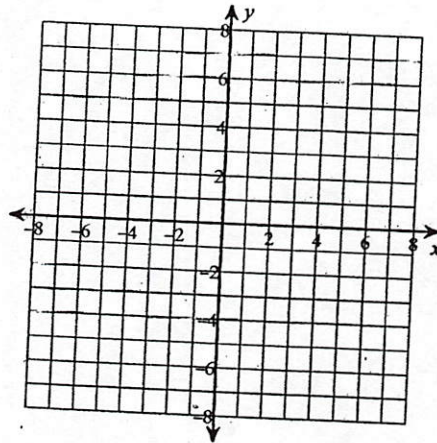
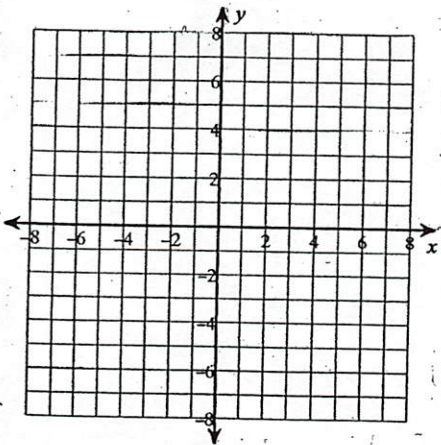
x			
y			

- A) x-intercept
- B) y-intercept
- C) asymptote
- D) domain
- E) range

31.  $f(x) = 3 - \log_3(x+2)$

x			
y			

- A) x-intercept
- B) y-intercept
- C) asymptote
- D) domain
- E) range



32.  $f(x) = \ln(x-4) - 1$

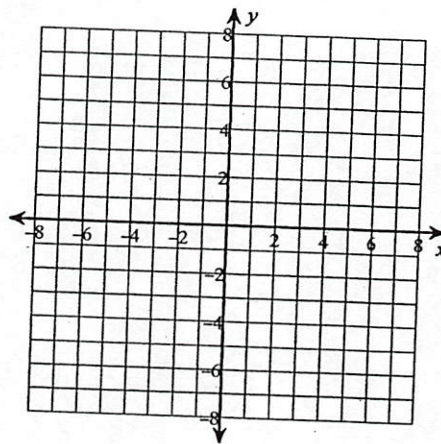
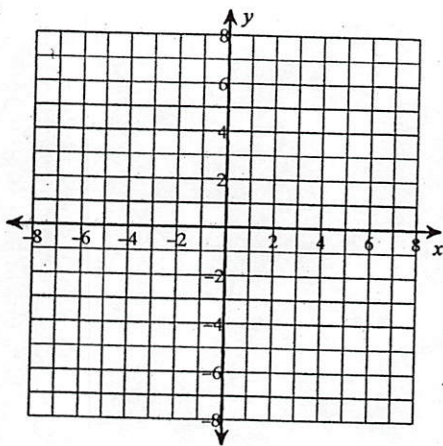
x			
y			

- A) x-intercept
- B) y-intercept
- C) asymptote
- D) domain
- E) range

33.  $f(x) = \left(\frac{2}{3}\right)^x$

x			
y			

- A) x-intercept
- B) y-intercept
- C) asymptote
- D) domain
- E) range



Calculator Portion

Use the change of base formula to evaluate to the nearest thousandth.

34.  $\log_5 75$

35.  $\log_9 4$

36.  $\log_5 9$

37.  $\log_{12} 11$

Solve for  $x$  in each of the following:

38.  $3e^{-5x} = 132$

39.  $e^{2x} - 6e^x + 8 = 0$

40.  $\ln x - \ln 3 = 2$

41.  $\log_3(x-2) + \log_3(x-3) = 2\log_3 x$

Use one of the following formulas to answer the question below:

$$A = P \left(1 + \frac{r}{n}\right)^{nt} \quad A = Pe^{rt} \quad T(t) = T_s + D_0 e^{-kt} \quad pH = -\log[H^+]$$

42. Find the interest rate on an account that doubles your money in 6 years when the interest is compounded continuously.
43. The half-life of an element is 30 years. How many years will it take until only 2% remains?
44. The pH of carbonated water is 3.9 and the pH of household ammonia is 11.9. What are their hydrogen-ion concentrations?
45. If you deposit \$500 in a savings account paying 3.2% interest, compounded monthly, how much money would you have at the end of 5 years?
46. Find the number of years it takes to have 10 times your initial investment saved at 10% interest compounded annually.
47. The population of a specific animal is decreasing. Ten years ago there were 1000 counted in a specific area. Today there are only 50. How many years will it take until only 1 remains?
48. A hard-boiled egg at temperature of  $96^\circ\text{C}$  is placed in  $16^\circ\text{C}$  water to cool. Four minutes later the temperature of the egg is  $45^\circ\text{C}$ . When will the temperature of the egg be  $20^\circ\text{C}$ ?