Name KEY Chapter 7 Practice Test

State the domain and range.

1. $y=(\frac{3}{4})^x$ Domain: Real Range: $y>0$

2. $y=e^{-3x}$ Domain: Real Range: $y>0$

3. $y=e^{3x}$ Domain: Real Range: $y>0$

4. $y=\log_4(x+2)$ Domain: $x>-2$ Range: Real

5. You buy a boat for $7500. The value of the boat decreases by 12% each year. Find the value of the boat after 10 years.

$7500(1-0.12)^{10}$

$7500(0.88)^{10} = \$2088.76$

6. Your uncle deposited $1300 into a college savings account for you when you were born. The account pays 1.6% annual interest, compounded monthly. Find the balance in the account on your 21st birthday.

$A=P(1+\frac{r}{n})^{nt}$

$P=1300 \quad r=0.016 \quad n=12 \quad t=21$

$A=1300\left(1+\frac{0.016}{12}\right)^{12\cdot 21}$

$A=\$1818.73$

7. You deposit $800 in an account that pays 2% interest compounded continuously. What is the balance after 10 years?

$A=Pe^{rt}$

$P=800 \quad r=0.02 \quad t=10$

$A=800e^{(0.02)(10)}$

$=\$977.12$

Find the inverse of the function.

8. $y=\log_6(x+5)$

$x=\log_6(y+5)$

$6^x=y+5$

$y=6^x-5$

9. $y=3\cdot 2^{x-3}$

$x=3\cdot 2^{y-3}$

$\frac{x}{3}=2^{y-3}$

$\log_2(\frac{x}{3})=\log_2 2^{y-3}$

$\log_2(\frac{x}{3})=y-3$

$y=\log_2(\frac{x}{3})+3$

Simplify the expression.

10. $e^3\cdot e^8$ e^{11}

11. $(4e^{-x})^5$ $4^5\cdot e^{-5x}$ $=1024e^{-5x}$

12. $e^{\ln x}$ x

13. $\log_4 64^x$ $\log_4(4^3)^x$ $\log_4 4^{3x}=3x$

Expand the expression.

14. $\ln 3x^4$ $\ln 3+\ln x^4$ $\ln 3+4\ln x$

15. $\log\frac{5x^3}{4y}$ $\log 5x^3-\log 4y$ $\log 5+\log x^3-(\log 4+\log y)$ $\log 5+3\log x-\log 4-\log y$

16. $\log_2 6x$ $\log_2 6+\log_2 x$

Condense the expression.

17. $\log_4 3 + 5 \log_4 x$

$\log_4 3 + \log_4 x^5$

$\log_4 3x^5$

18. $\ln 46 - 5 \ln y$

$\ln 46 - \ln y^5$

$\ln \left(\frac{46}{y^5}\right)$

Solve the equation.

19. $5^{(x-4)} = 25^{(x-6)}$

$5^{x-4} = (5^2)^{x-6}$

$5^{x-4} = 5^{2x-12}$

$x - 4 = 2x - 12$

$8 = x$

check: $5^4 = 25^2$ ✓

20. $3^{(2x+4)} = 27^{(3x-6)}$

$3^{2x+4} = (3^3)^{3x-6}$

$3^{2x+4} = 3^{9x-18}$

$2x + 4 = 9x - 18$

$22 = 7x$

$\frac{22}{7} = x$

check: $3^{\frac{72}{7}} = 27^{\frac{24}{7}}$ ✓

21. $-5e^{3x} + 16 = 6$

$-5e^{3x} = -10$

$e^{3x} = 2$

$\ln e^{3x} = \ln 2$

$3x = 0.693$

$x = 0.231$

check: $-5e^{3(0.231)} + 16 = 6$

$6 = 6$ ✓

22. $\log_4 (x - 2) = 3$

$4^{\log_4 (x-2)} = 4^3$

$x - 2 = 64$

$x = 66$

check: $\log_4 (66-2) = 3$

$\log_4 (64) = 3$

✓

23. $\log_3 x + \log_3 (x + 6) = 3$

$\log_3 x(x+6) = 3$

$3^{\log_3 x(x+6)} = 3^3$

$x(x+6) = 27$

$x^2 + 6x - 27 = 0$

$(x+9)(x-3) = 0$

$x = -9, 3$

check: $\log_3 (-9) + \log_3 (-9+6) = 3$

does not check, -9 is extraneous

check: $\log_3 (3) + \log_3 (3+6) = 3 \rightarrow$ $1 + 2 = 3$

$x = 3$ is a solution.

24. $7^{2x} = 30$

$\log_7 7^{2x} = \log_7 30$

$2x = \frac{\log 30}{\log 7} = 1.748$

$x = 0.874$

check: $7^{2(.874)} = 30$

✓

25. Four-legged animals run with two different types of motion: trotting and galloping. An animal that is trotting has at least one foot on the ground at all times. An animal that is galloping has all four feet off the ground at times. The number S of strides per minute at which an animal breaks from a trot to a gallop is related to the animal's weight w (in pounds) by the model $S = 256.2 - 47.9 \log w$. Approximate the number of strides per minute for a 450 pound horse when it breaks from a trot to a gallop.

$S = 256.2 - 47.9 \log 450$

$= 256.2 - 47.9 (2.653)$

$= 256.2 - 127.09$

$= 129$ strides/minute