Advanced Algebra w/ Trig **Name:** key
Ch. 7 Review **Period:**

Questions marked with *** are "Calculator OK". The rest should be completed without a calculator.

(1-9) Solve for x without a calculator.

1. $\left(\frac{1}{9}\right)^{2x-1} = (81)^{x-5}$

$(9^{-1})^{2x-1} = (9^2)^{x-5}$

$-1(2x-1) = 2(x-5)$

$-2x+1 = 2x-10$

$-4x = -11$

$x = \frac{11}{4}$

2. $64^{5x-1} = 4^{7x+2}$

$(4^3)^{5x-1} = 4^{7x+2}$

$3(5x-1) = 7x+2$

$15x-3 = 7x+2$

$8x = 5$

$x = 5/8$

3. $\log_7 2 + \log_7 9 = \log_7 x$

$\log_7(2\cdot 9) = \log_7 x$

$2\cdot 9 = x$

$18 = x$

4. $\log_7 x + \log_7(x+4) = \log_7 60$

$\log_7[x(x+4)] = \log_7 60$

$x^2+4x = 60$

$x^2-4x-60 = 0$

$(x-10)(x+6) = 0$

$x-10=0 \quad x+6=0$

$x = 10$ ~~$x = -6$~~ extran.

5. $\log_4 2x - \log_4 5 = \frac{1}{2}$

$\log_4\left(\frac{2x}{5}\right) = \frac{1}{2}$

$4^{\frac{1}{2}} = \frac{2x}{5}$

$2 = \frac{2x}{5}$

$10 = 2x$

$x = 5$

6. $2\log_5 x = \log_5 9$

$\log_5 x^2 = \log_5 9$

$x^2 = 9$

$x = 3$

7. $\log 10 + \log 100 = x$

$\log[10\cdot 100] = x$

$\log_{10} 1000 = x$

$10^x = 1000$

$x = 3$

8. $\log_5 150 - \log_5 6 = \log_5 x$

$\log_5\left(\frac{150}{6}\right) = \log_5 x$

$\log_5 25 = \log_5 x$

$25 = x$

9. $\log x + \log 5 = 2$

$\log 5x = 2$

$\log_{10} 5x = 2$

$10^2 = 5x$

$100 = 5x$

$x = 20$

(10-13) Evaluate in terms of A and B. Let A = $\log_2 7$ and B = $\log_2 11$.

10. $\log_2 77$

$\log_2(11\cdot 7)$

$\log_2 11 + \log_2 7$

$B + A$

11. $\log_2 \frac{11}{7}$

$\log_2 11 - \log_2 7$

$B - A$

12. $\log_2 22$

$\log_2(11\cdot 2)$

$\log_2 11 + \log_2 2$

$B + 1$

13. $\log_2 \frac{1}{11}$

$\log_2(11^{-1})$

$-\log_2 11$

$-B$

*****(14-17) Solve for x. Round any solutions to the nearest hundredth.**

14. $7^{x+5} = 11$

$x+5 = \log_7 11$

$x+5 = \frac{\log 11}{\log 7}$

$x = -3.77$

15. ~~$3^{5x-1} = 4^{7x+2}$~~

16. $18(2)^{3x-5} - 7 = 29$

$+7 \quad +7$

$\frac{18(2)^{3x-5}}{18} = \frac{36}{18}$

17. $\log(3x-5) = 4$

$10^4 = 3x-5$

$10000 = 3x-5$

$10005 = 3x$

$\frac{18(2)^{3x-5}}{18} = \frac{36}{18}$

$2^{3x-5} = 2^1$

$3x - 5 = 1$

$3x = 6$

$x = 2$

$10^4 = 3x - 5$

$10000 = 3x - 5$

$10005 = 3x$

$x = 3335$

***(18-22) Solve by using logarithms and/or exponents. Round answers to the nearest hundredth.**

18. Tony opened a bank account with $50,000 that earns 4.26% annual interest. In how many years will the amount in his account be doubled? $A = P(1 + \frac{r}{n})^{nt}$

$100,000 = 50,000(1 + \frac{0.0426}{1})^{t \cdot 1}$

$2 = 1.0426^t$

$t = \log_{1.0426} 2$ → $t = \frac{\log 2}{\log 1.0426} = 16.62$ years

19. Tina opens a bank account with $50,000 that earns 4.26% annual interest compounded quarterly. How much will the account be worth after 5 years? $A = P(1 + \frac{r}{n})^{nt}$

$A = 50,000(1 + \frac{0.0426}{4})^{4 \cdot 5}$

$= \$61,799.59$

20. The population of Chicago Heights in 2009 was 54,000. A census has determined that the population depreciates at a rate of 5.6% each year. $y = a(1 - r)^t$

a) When will the population depreciate to 10,000 people?

$10000 = 54000(1 - .056)^t$

$.185 = .944^t$

$t = \log_{.944} 0.185$ → $t = \frac{\log 0.185}{\log 0.944} = 29.28$ years

2009

29.28

2038

b) What was the population in 2005?

2005

−2009

−4

$y = 54000(1 - .056)^{-4}$

$= 68,000$ people

~~**21.**~~ Find the equation of an exponential function that goes through (-3, 8) and (4, 55). Hint: Make a table!

22. You deposit $1000 into a bank account that collects continuous compounded interest at a rate of 3.4%. How long will it take for your money to triple? $A = Pe^{rt}$

$2000 = 1000e^{.034t}$

$2 = e^{.034t}$

$.034t = \log_e 2$

$2 = e^{\cdots}$

$.034t = \log_e 2$

$.034t = \ln 2$

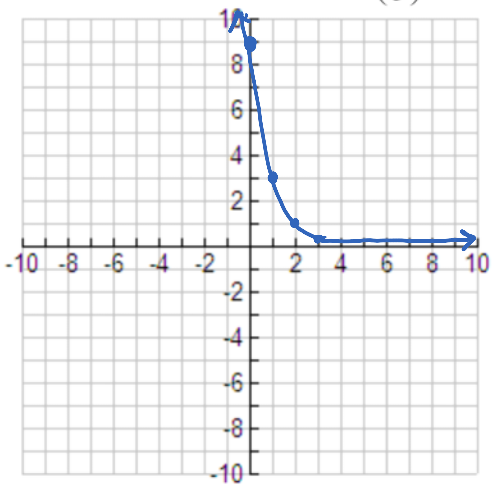
$.034t = .693$

$t = 20.39$ years

(23-25) Sketch the graph of the function indicated and complete the information about the graph below.

23. Draw the graph of $f(x) = 9\left(\frac{1}{3}\right)^x$ without a calculator.

$y = a \cdot b^x$ (y-int. ↑, multiplier ↑)



x	y	
0	9	) ⅓
1	3	) ⅓
2	1	
3	⅓	

State the domain: $(-\infty, \infty)$

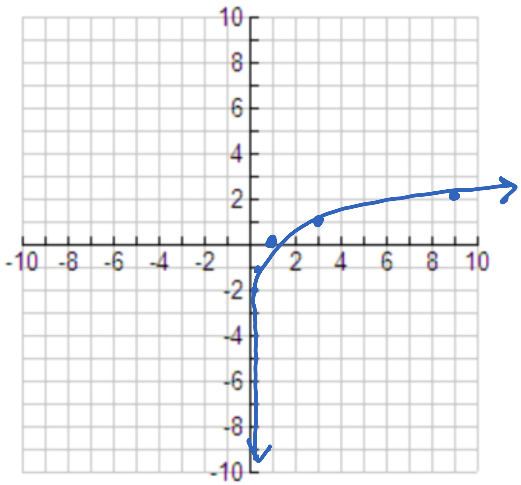
State the range: $(0, \infty)$

y-intercept: $(0, 9)$

Equation of asymptote: $y = 0$

Growth or Decay? decay $(b < 1)$

24. Draw the graph of $f(x) = \log_3 x$ without a calculator.



State the domain: $(0, \infty)$

State the range: $(-\infty, \infty)$

y-intercept: n/a

Equation of asymptote: $x = 0$

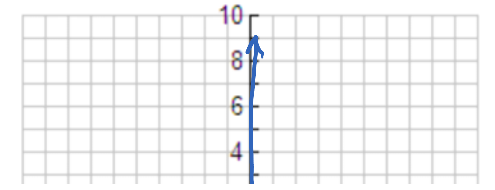
$f^{-1}(x) = 3^x$

x	y
-2	1/9
-1	1/3
0	1
1	3
2	9

$f(x) = \log_3 x$

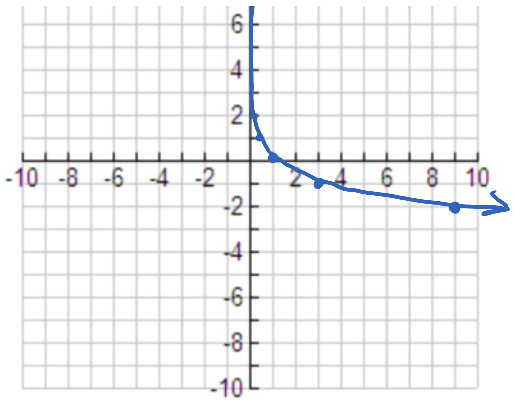
x	y
1/9	-2
1/3	-1
1	0
3	1
9	2

25. Draw the graph of $f(x) = \log_{\frac{1}{3}} x$ without a calculator.



State the domain: $(0, \infty)$

State the range: $(-\infty, \infty)$



State the range: $(-\infty, \infty)$

y-intercept: n/a

Equation of asymptote: $X = 0$

$f^{-1}(x) = \left(\frac{1}{3}\right)^x$

x	y
-2	9
-1	3
0	1
1	1/3
2	1/9

$f(x) = \log_{\frac{1}{3}}(x)$

x	y
9	-2
3	-1
1	0
1/3	1
1/9	2