1	$9,147.51$	14	$\ln(12/5) - 4$
2	$9,612.\underline{86}$	15	81
3	$9,7812.\underline{23}$	16	$\frac{1}{25}$
4	9.2	17	9
5	$7,728$	18	2
6	17.3	19	10
7	3	20	$\frac{2}{15}$
8	5	21	$\log_4\left(\frac{x^3}{y^2}\right)$
9	-6	22	$\log\left(\frac{x^5}{\sqrt{y}}\right)$
10	-2	23	$3\log(x) + \log(y) + 2\log(z)$
11	$\frac{\ln(5)}{\ln(3)}$	24	$\frac{1}{3}\log(x) - \frac{1}{3}\log(y)$
12	$\frac{\ln(11)}{\ln(7)} - 3$	25	Solutions
13	$-\frac{\ln(10)}{\ln(5)}$		

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East Los Angeles College
Department of Mathematics
Math 125
Test 4

Investment- You plan on investing $ 1500 for 25 years at an annual interest rate of 7.5%. What does your investment grow to if interest is compounded:

1. Annually

2. Quarterly

3. Continuously

4. How long will it take for your money to double? 2Ao

Population Decline- In 2007, ELAC's student population was 12,000 students.

5. If the population decline rate was 4% per year, what is the current population in 2018?

6. How long will it take for the population to decline? 2Ao half its initial amount? $\frac{1}{2}$Ao

Solve the following Exponential Equations.

7. $2^{x+1} = 16$

8. $5^{x-2} = 125$

9. $2^{x} = \frac{1}{32}$

10. $10^{x} = 0.01$

11. $3^{x} = 5$

12. $2^{x+3} = 11$

13. $5^{-x} = 10$

14. $5e^{x+4} = 12$

Solve the following logarithmic equations.

15. $log_3(x) = 4$

16. $log_5(x) = -2$

17. $log_2(x-1) = 3$

18. $log_{16}(x+2) = \frac{1}{2}$

19. $\log(x-9) + \log(x) = 1$

20. $log_4(x+6) - log_4(x) = 2$

Use properties of logs to write as a single log.

21. $3log_4(x) - 2log_4(y)$

22. $5log(x) - \frac{1}{2}log(y)$

Write as a sum and difference of logs.

23. $log(x^3yz^2)$

24. $log\left(\sqrt[3]{\frac{x}{y}}\right)$

25. What's your name?

Math 125 Test 4

$A = A_0\left(1 + \frac{r}{n}\right)^{nt}$; $A = A_0 e^{rt}$

(1) $A_0 = 1500$; $t = 25$, $r = 7.5\%$

$r = 0.075$

$n = 1$; annual

$A = 1500\left(1 + \frac{0.075}{1}\right)^{1t}$

$A = 1500 \cdot 1.075^{t}$; $t = 25$

$A = 1500 \cdot 1.075^{25}$; $A = 9,147.51$

(2) Quarterly ; $n = 4$

$A = 1500\left(1 + \frac{0.075}{4}\right)^{4 \cdot 25}$

$A = 1500 \cdot 1.018875^{100}$; $A = 9,612.88$

(3) $A = 1500\, e^{0.075 \cdot 25}$

$A = 1500\, e^{1.875}$; $A \approx 9,7012.23$

(4) Double :

$t = \frac{\ln(2)}{r}$; $t = \frac{\ln(2)}{0.075}$; $t \approx 9.2$ years

(5) $P = P_0 e^{-kt}$; $P_0 = 12000$

$k = 0.04$; $k = 4\%$

$t = 11$ years

$P = 12000\, e^{-0.04 \cdot 11}$

$P = 7,728$

(6) Half ; $t = \frac{\ln(1/2)}{-k}$; $t = \frac{\ln(1/2)}{-0.04}$

$t = 17.3$ years

(7) $2^{x+1} = 16$

$2^{x+1} = 2^4$

$x+1 = 4$

$-1 \quad -1$

$x = 3$

(8) $5^{x-2} = 125$

$\Leftrightarrow 5^3$

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

$x-2 = 3$

$+2 \quad +2$

$x = 5$

(9) $2^x = \frac{1}{32} \sim 2^6$

$2^x = 2^{-6}$

$x = -6$

(10) $10^x = 0.01$

$\Leftrightarrow \frac{1}{100}$

$10^x = \frac{1}{100}$

$10^x = 10^{-2}$; $x = -2$

(11) $3^x = 5$

$\ln(3^x) = \ln(5)$

$x \ln(3) = \ln(5)$

$x = \frac{\ln(5)}{\ln(3)}$

(12) $2^{x+3} = 11$

$\ln(2^{x+3}) = \ln(11)$

$(x+3)\ln(2) = \ln(11)$

$x+3 = \frac{\ln(11)}{\ln(2)}$

$-3 \qquad -3$

$x = \frac{\ln(11)}{\ln(2)} - 3$

(13) $5^{-x} = 10$

$\ln(5^{-x}) = \ln(10)$

$-x \ln(5) = \ln(10)$

$x = -\frac{\ln(10)}{\ln(5)}$

(14) $\frac{5e^{x+4}}{5} = \frac{12}{5}$

$e^{x+4} = \frac{12}{5}$

$\ln(e^{x+4}) = \ln(12/5)$

$(x+4)\cancel{\ln(e)}^{1} = \ln(12/5)$

$x+4 = \ln(12/5)$

$-4 \qquad -4$

$x = \ln(12/5) - 4$

(15) $\log_3(x) = 4$.

$3^4 = x$;

$x = 81$

(16) $\log_5(x) = -2$

$5^{-2} = x$

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

$x = \frac{1}{25}$

(17) $\log_2(x-1) = 3$

$2^3 = x-1$

$8 = x-1$

$+1 \quad +1$

$x = 9$

(18) $\log_{16}(x+2) = \frac{1}{2}$

$16^{1/2} = x+2$

$\sqrt{16} = x+2$

$4 = x+2$

$-2 \quad -2$

$x = 2$

(19) $\log(x-9) + \log(x) = 1$

$\log_{10}[(x-9)\cdot x] = 1$

$10^1 = (x-9)x$

$x^2 - 9x = 10$

$x^2 - 9x - 10 = 0$

$(x-10)(x+1) = 0$

$x-10=0 \quad | \quad x+1=0$

$x = 10 \quad | \quad x = -1$

$\{10\}$ | not poss. b/c

(20) $\log_4(x+6) - \log_4(x) = 2$

$\log_4\left(\frac{x+6}{x}\right) = 2$

$4^2 = \frac{x+6}{x}$; $16 = \frac{x+2}{x}$

$16x = x+2$
$-x \quad -x$; $15x = 2$

$x = \frac{2}{15}$

(21) $3\log_4(x) - 2\log_4(y)$

$\log_4(x^3) - \log_4(y^2)$

$\log_4\left(\frac{x^3}{y^2}\right)$

(22) $5\log(x) - \frac{1}{2}\log(y)$

$\log(x^5) - \log(y^{1/2})$

$\log\left(\frac{x^5}{\sqrt{y}}\right)$

(23) $\log(x^3 y z^2)$

$= \log(x^3) + \log(y) + \log(z^2)$

$3\log(x) + \log(y) + 2\log(z)$

(24) $\log \sqrt[3]{\frac{x}{y}} = \log\left[\left(\frac{x}{y}\right)^{1/3}\right]$

$\frac{1}{3}\log\left(\frac{x}{y}\right) = \frac{1}{3}[\log(x) - \log(y)]$

$\frac{1}{3}\log(x) - \frac{1}{3}\log(y)$