AFM MIDTERM REVIEW UNIT 2 Name key 2017

Solve each equation.

1) $64^{3n} = 8$

$\log_{64} 8 = 3n$

$\frac{1}{2} = 3n$

$n = 1/6$

2) $8^{-n} = \frac{1}{64}$

$\log_8 \frac{1}{64} = -n$

$-2 = -n$

$2 = n$

3) $10^{x+1} + 5 = 56$

$10^{x+1} = 51$

$\log_{10} 51 = x+1$

$x = .7076$

4) $-8 \cdot 3^{x-5} = -5$

$3^{x-5} = 5/8$

$\log_3 5/8 = x-5$

$x = 4.5722$

5) $-6^{7a} = -59$

$6^{7a} = 59$

$\log_6 59 = 7a$

$a = .3251$

6) $\log_9 (9 - 2n) = \log_9 4n$

$9 - 2n = 4n$

$9 = 6n$

$n = 9/6$

$n = 3/2$

7) $\log_{19} (-2n - 7) = \log_{19} 4n$

$-2n - 7 = 4n$

$-7 = 6n$

$n = -7/6$ $\emptyset$

8) $\log_{16} (27 - 2k) = \log_{16} (k^2 + 4k)$

$27 - 2k = k^2 + 4k$

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

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

$k = -9$

$k = 3$

9) $\log_9 (-12 + 3n^2) = \log_9 (4n^2 + 8n)$

$-12 + 3n^2 = 4n^2 + 8n$

$0 = n^2 + 8n + 12$

$0 = (n+6)(n+2)$

$n = -6$

$n = -2$

10) $\log_2 (x^2 - 4) - \log_2 10 = 5$

$\log_2 \frac{x^2-4}{10} = 5$

$2^5 = \frac{x^2-4}{10}$

$32 = \frac{x^2-4}{10}$

$320 = x^2 - 4$

$324 = x^2$

$\pm 18 = x$

11) $\log_7 x - \log_7 (x-2) = 1$

$\log_7 \frac{x}{x-2} = 1$

$7^1 = \frac{x}{x-2}$

$7x - 14 = x$

$-14 = -6x$

$7/3 = x$

12) $\log_6 8 - \log_6 5x = \log_6 54$

$\log_6 \frac{8}{5x} = \log_6 54$

$8 = 270x$

$x = .0296$

13) $\log x + \log (x+48) = 2$

$\log (x^2 + 48x) = 2$

$10^2 = x^2 + 48x$

$0 = x^2 + 48x - 100$

$(x+50)(x-2) = 0$

$x = -50$ $x = 2$

14) $e^{4r} + 6 = 74$

$e^{4r} = 68$

$\ln 68 = 4r$

$r = 1.0549$

15) $\ln (r + 10) = \ln (2r + 2)$

$r + 10 = 2r + 2$

$-r = -8$

$r = 8$

16) $\ln 2 + \ln 2x^2 = 4$

$\ln 4x^2 = 4$

$e^4 = 4x^2$

$\frac{e^4}{4} = x^2$

$\pm\sqrt{\frac{e^4}{4}} = x$

$x = \pm 3.6945$

17) $\ln 5 + \ln (x-2) = 4$

$\ln (5x - 10) = 4$

$e^4 = 5x - 10$

$e^4 + 10 = 5x$

$\frac{e^4+10}{5} = x$

$x = 12.9196$

18) $4^{-x} + 4 = 75$

$4^{-x} = 71$

$\log_4 71 = -x$

$x = -3.0749$

Expand each logarithm.

19) $\log_8 (7\sqrt{12 \cdot 11})$

$\log_8 7 + \frac{\log_8 12}{2} + \frac{\log_8 11}{2}$

20) $\log_6 (a \cdot b \cdot c^4)$

$\log_6 a + \log_6 b + 4\log_6 c$

21) $\log_9 (7 \cdot 3 \cdot 8^3)$

$\log_9 7 + \log_9 3 + 3\log_9 8$

22) $\log_7 (z\sqrt{x \cdot y})$

$\log_7 z + \frac{\log_7 x}{2} + \frac{\log_7 y}{2}$

23) $\log \frac{x^4}{y^6}$

$4\log x - 6\log y$

Condense each expression to a single logarithm.

24) $3\log_4 z + \dfrac{\log_4 x}{2}$

$\log_4 z^3\sqrt{x}$

25) $5\log_3 11 - 20\log_3 6$

$\log_3 \dfrac{11^5}{6^{20}}$

26) $5\log_3 6 + 10\log_3 11$

$\log_3 6^5 \cdot 11^{10}$

27) $5\log_9 a + 6\log_9 b$

$\log_9 a^5 b^6$

28) $6\log_3 5 + \dfrac{\log_3 6}{2}$

$\log_3 5^6\sqrt{6}$

29) James invests \$7,791 in a retirement account with a fixed annual interest rate of 4% compounded 12 times per year. What will the account balance be after 15 years?

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

$A = 7{,}791\left(1+\frac{.04}{12}\right)^{12\cdot 15}$

\$14,181.97

30) Jessica invests \$3,459 in a savings account with a fixed annual interest rate of 8% compounded continuously. What will the account balance be after 6 years?

$A = Pe^{rt}$

$A = 3459e^{.08\cdot 6}$

\$5,590.00

31) James invests a sum of money in a retirement account with a fixed annual interest rate of 2% compounded 12 times per year. After 20 years, the balance reaches \$8,973.32. What was the amount of the initial investment?

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

$8{,}973.32 = P\left(1+\frac{.02}{12}\right)^{12\cdot 20}$

P=\$6,017

32) Ted invests \$8,369 in a savings account with a fixed annual interest rate compounded continuously. After 11 years, the balance reaches \$20,176.82. What is the interest rate of the account?

$A = Pe^{rt}$

$20{,}176.82 = 8369e^{r\cdot 11}$

r=8%

33) Amanda invests \$2,499 in a savings account with a fixed annual interest rate of 7% compounded 6 times per year. How long will it take for the account balance to reach \$5,373.25?

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

$5373.25 = 2499\left(1+\frac{.07}{6}\right)^{6t}$

t=11 yrs

34) Stephanie invests \$4,156 in a savings account with a fixed annual interest rate compounded 6 times per year. After 12 years, the balance reaches \$5,281.20. What is the interest rate of the account?

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

$5281.20 = 4156\left(1+\frac{r}{6}\right)^{6\cdot 12}$

r=2%

35) Nicole invests \$5,430 in a retirement account with a fixed annual interest rate of 8% compounded continuously. How long will it take for the account balance to reach \$19,529.75?

$A = Pe^{rt}$

$19529.75 = 5430e^{.08t}$

t=16 yrs

36) Beth invests \$3,971 in a savings account with a fixed annual interest rate of 3% compounded 4 times per year. How long will it take for the account balance to reach \$5,684.11?

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

$5684.11 = 3971\left(1+\frac{.03}{4}\right)^{4t}$

t=12 years

37) Anjali invests a sum of money in a savings account with a fixed annual interest rate of 9% compounded 6 times per year. After 9 years, the balance reaches \$12,704.96. What was the amount of the initial investment?

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

$12704.96 = P\left(1+\frac{.09}{6}\right)^{6\cdot 9}$

P=\$5686