Name: _____

Solving Exponential & Logarithmic Functions

1) Solve the following equations

1) $4^x = 16^{2x-2}$

2) $0.5^{x^2} = 0.125$

3) $0.1^x = 100$

4) $\left(\frac{1}{4}\right)^x = 2$

5) $0.25^x = 16$

6) $2^{x^3} = 0.25$

7) $0.1^{x+2} = 100^{\frac{1}{3}}$

8) $3^x\left(3^x - 3\right) = 0$

9) $6 = 2^t$

10) $0.28 = (0.96)^t$

11) $35 = 4(1.04)^t$

12) $\log_2 x = 7$

13) $\log_x 4 = \frac{1}{2}$

14) $\log_x 8 = 3$

15) $\log_{16} 8 = x$

16) $\log_2 x^3 = \log_2 (4x)$

17) $\log_3 x = 5$

18) $\log_2 \left(\log_5 x\right) = 2$

19) $16^{\log_4 x} = 4$

20) $e^{3x-2} = 4$

21) $\ln\left(x^2 + x - 1\right) = 0$

22) $\ln\left(4x - 3\right) = 7$

23) $\ln\left(\ln x\right) = 1$

24) $\ln x + \ln\left(x + 7\right) = \ln 4 + \ln 2$

2) Solve the following equations

1) $e^{2x} + 3e^x - 4 = 0$

2) $\dfrac{e^x - e^{-x}}{2} = -\dfrac{3}{4}$

3) $2^{2x+3} + 2^x - 7 = 0$

4) $2^{2x} - 5 \bullet 2^x + 4 = 0$

5) $3^{2x} - 6 \bullet 3^x - 27 = 0$

6) $4^x - 3^{x-0.5} = 3^{x+0.5} - 2^{2x-1}$

7) $2e^{-3x} - 3e^{-x} + e^x = 0$

8) $5e^{4x} - 13e^{2x} - 6 = 0$

9) $e^{2x} + 2e^x - 8 = 0$

3) Solve the system of equations

    1) $\begin{cases} x - y = 5 \\ e^x = \dfrac{2}{e^y} \end{cases}$

    2) $\begin{cases} \log x + \log y = 2 \\ x + y = 29 \end{cases}$

    3) $\begin{cases} \log x + \log 2y = 1 \\ x^2 + y^2 = 26 \end{cases}$

4) Solve the following equations

    1) $Log\,(x-1) + Log\,(x+2) = 2Log\,2$

    2) $Log_a\,(x+5) + Log_a\,(x+1) - 3Log_a\,3 = 0$

    3) $Log\,(x+5) + Log\left(\dfrac{-x+7}{4}\right) - 3Log\,2 = 0$

    4) $Log_a\,x + Log_a\,(x+1) - 3 = 0$

5) The number of bacteria cells growing exponentially according to the mathematical model $y = y_0\,(1.004)^t$, where t is measured in hours. If there are 10,000 cells when t=8, how many cells were there when t=0

6) The number of compact discs purchased each year is increasing exponentially. The number N, in millions, purchased is given by:

$N\,(t) = 7.5\,(6)^{0.5t}$

    1) Where t is time in years and t=0 corresponds to the year 1990
    2) After what amount of time will 1 billion compact discs be sold in a year?

7) It is known that $\dfrac{1}{4}$ of all aluminum cans distributed will be recycled each year. A beverage company distributed 250, 000 cans. The number still in use after time t, in years is given by the function

$N\,(t) = 250000\left(\dfrac{1}{4}\right)^t$

    1) After how many years will 60,000 cans still be in use?
    2) After what amount of time will only 10 cans still be in use?