

I. Solve each exponential equation. Keep answers as fraction, if not round to 3 decimal places. Must show ALL of YOUR WORK to RECEIVE CREDIT!!

1.) $\left(\frac{1}{2}\right)^{3-x} = 16$ $(2^{-1})^{3-x} = 2^4$ $-3 + x = 4$ $x = 7$	2.) $\frac{-5e^{x+3}}{5} = -10$ $e^{x+3} = 2$ $\ln e^{x+3} = \ln(2)$ $x+3 = \ln(2)$ $x = -2.303$	3.) $64^x = 8^{2x+1}$ $(2^6)^x = (2^3)^{2x+1}$ $6x = 6x+3$ $0 = 3$ No solution	4.) $7^{x+2} = 3$ $\log(7^{x+2}) = \log 3$ $(x+2)\log 7 = \log 3$ $\log 7 \neq 0$ $x+2 = \frac{\log 3}{\log 7}$ $x = -1.435$
5.) $2e^{x-1} + 3 = -5$ $\frac{2e^{x-1}}{2} = \frac{-8}{2}$ $e^{x-1} = -4$ $\ln e^{x-1} = \ln(-4)$ $x-1 = \ln(-4)$ No solution	6.) $125^{3x+1} \cdot 625^{-3x} = 125^{-3x}$ $(5^3)^{3x+1} \cdot (5^4)^{-3x} = (5^3)^{-3x}$ $9x+3-12x = -9x$ $-3x+3 = -9x$ $+3x = -6x$ $3 = -6x$ $x = -\frac{1}{2}$	7.) $\frac{16}{3+e^{4x}} = 2$ $2(3+e^{4x}) = 16$ $3+e^{4x} = 8$ $e^{4x} = 5$ $\ln e^{4x} = \ln(5)$ $4x = \ln(5)$ $x = .402$	8.) $243^{2x+2} \cdot 27^{-2x} = 9$ $(3^5)^{2x+2} \cdot (3^3)^{-2x} = 3^2$ $10x+10-6x = 2$ $4x+10 = 2$ $4x = -8$ $x = -2$
9.) $2^{-x} - 4 = 5$ $\frac{2^{-x}}{2} = \frac{9}{2}$ $2^{-x} = 9$ $\log 2^{-x} = \log 9$ $-x \log 2 = \log 9$ $x = -3.170$	10.) $36 \cdot \left(\frac{1}{6}\right)^{3-2x} = 216 \cdot 2^{x-1}$ $6^2 \cdot (6^{-1})^{3-2x} = (6^3) \cdot 2^{x-1}$ $6^{-3+2x} = 6^3 \cdot 2^{x-1}$ $-3+2x = 3 + (x-1)\log 2$ $x = -\frac{2}{9}$	11.) $4e^{2x+3} - 1 = 11$ $4e^{2x+3} = 12$ $e^{2x+3} = 3$ $\ln e^{2x+3} = \ln 3$ $2x+3 = \ln 3$ $2x = \ln 3 - 3$ $x = -.951$	12.) $3^{2-5x} + 5 = 5$ $3^{2-5x} = 0$ $\log(3^{2-5x}) = \log 0$ $(2-5x)\log 3 = \log 0$ No solution

II. Solve each logarithmic equation. Keep answers as fraction, if not round to 3 decimal places. Must show ALL of YOUR WORK to RECEIVE CREDIT!! CHECK YOUR SOLUTION(S)!

<p>13.) $\log(3x+5)=2$</p> $10^2 = 3x+5$ $100 = 3x+5$ $95 = 3x$ $x = \frac{95}{3}$	<p>14.) $2 - \ln(3-x) = 0$</p> $-\ln(3-x) = -2$ $\ln(3-x) = 2$ $3-x = e^2$ $-x = e^2 - 3$ $x = -4.389$	<p>15.) $\log_3(2-x) = 3$</p> $3^3 = 2-x$ $27 = 2-x$ $25 = -x$ $x = -25$	<p>16.) $\ln \sqrt{x+4} = 3$</p> $(\sqrt{x+4})^2 = (e^3)^2$ $x+4 = e^6$ $x = 399.429$
<p>17.) $\log(\ln x + 5) = 2$</p> $4^2 = \ln x + 5$ $16 = \ln x + 5$ $11 = \ln x$ $x = 59374.149$	<p>18.) $\ln(2+x) - \ln(x-3) = 1$</p> $\ln\left(\frac{2+x}{x-3}\right) = 1$ $\frac{2+x}{x-3} = e^1$ $2+x = e(x-3)$ $2+x = ex - 3e$ $x = 2.346$	<p>19.) $2\log x = \log 2 + \log(3x-4)$</p> $\log x^2 = \log 2 + \log(3x-4)$ $x^2 = 2(3x-4)$ $x^2 - 6x + 8 = 0$ $(x-4)(x-2) = 0$ $x-4 = 0 \quad x-2 = 0$ $x = 4 \quad x = 2$	<p>20.) $\log_5\left(\frac{x+1}{x-1}\right) = 2$</p> $5^2 = \frac{x+1}{x-1}$ $25 = \frac{x+1}{x-1}$ $25(x-1) = x+1$ $25x - 25 = x+1$ $24x = 26$ $x = \frac{13}{12}$
<p>21.) $\log(2x-3) = \log(3-2x) - \log x$</p> $\log(2x-3) = \log\left(\frac{3-2x}{x}\right)$ $10^{\log(2x-3)} = 10^{\log\left(\frac{3-2x}{x}\right)}$ $2x-3 = \frac{3-2x}{x}$ $2x^2 - 3x = 3 - 2x$ $2x^2 - x - 3 = 0$ $(2x-3)(x+1) = 0$ $2x-3 = 0 \quad x+1 = 0$ $x = \frac{3}{2} \quad x = -1$ <p>(will get $\log(\log 4)$)</p> <p>No solution</p>	<p>22.) $\log_3(x-5) + \log_3(x+3) = 1$</p> $\log_3(x^2 - 2x - 15) = 1$ $9^1 = x^2 - 2x - 15$ $x^2 - 2x - 24 = 0$ $(x-6)(x+4) = 0$ $x-6 = 0 \quad x+4 = 0$ $x = 6 \quad x = -4$ <p>(will get $\log(\log 4)$)</p>	<p>23.) $\ln(5x-3) = \ln(x-1)$</p> $5x-3 = x-1$ $4x = 2$ $x = \frac{1}{2}$ <p>(will get $\log(\log 4)$)</p> <p>No solution</p>	