

## 4.3 – Exponential and Logarithmic Equations

### Solving Exponential Equations Examples:

Notes: 1.) Keep answers as (reduced) fractions when possible.

If a decimal can NOT be turned into a fraction – ROUND to 3 decimal places

### Exponential Equations: Type 1 – Both Sides have the Same Base

1a.) $2^{2x+15} = 8$	1b.) $4^{3x} = 32^{x+1}$	1c.) $3^{2x+5} = \left(\frac{1}{9}\right)^{x-1}$	1d.) $25 \cdot \left(\frac{1}{125}\right)^{x+4} = \sqrt{3125}$
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### Exponential Equations: Type 2: Both Sides are NOT the Same Base – Take log (or ln) of both sides

1e.) $3^{2x-1} = 7$	1f.) $3 \cdot 4^x + 11 = 2$	1g.) $2e^{5x-3} = 16$	1h.) $\frac{12}{1+e^{-x}} = 2$
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## **Solving Logarithmic Equations Examples:**

Notes: 1.) Keep answers as (reduced) fractions when possible – if not, ROUND to 3 places!

2.) Remember – You CAN NOT take log of a negative number or zero (b/c VA:  $x = 0$ )

Some solutions MAY OR MAY NOT WORK (could also have no solutions)!

When done solving a log equation – Check to see that it works in the original problem!

### **Logarithmic Equations: Type 1 – Both sides (and every term) is a logarithm**

2a.) $\log_5(6 - 3x) = \log_5(10 - 5x)$	2b.) $\log(x - 3) + \log x = \log 28$	2c.) $\ln(2x + 1) - \ln(x - 1) = \ln 7$
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### **Logarithmic Equations: Type 2 – SINGLE LOG on one side and a CONSTANT on the other side**

2d.) $\log_3(2x + 15) = 2$	2e.) $\log_2 x + \log_2(x - 2) = 3$	2f.) $4 - 6\ln(3x - 1) = -20$
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