Pre Calculus
129

To Exponentiate both sides of an equation means that we make those sides become exponents of a common base, frequently e.

Solve for x: $\ln(x - 2) = 5.6$
Exponentiating both sides, we get $e^{\ln(x-2)} = e^{5.6}$ □ $x - 2 = e^{5.6}$ □ $x = 2 + e^{5.6} = \boxed{272.426}$

Solve for x: $3^{4x} = 425$
Two Methods:

1. Take the $\log_3$(of both sides) □ $\log_3(3^{4x}) = \log_3(425)$ □ $4x \log_3(3) = \dfrac{\log(425)}{\log(3)}$

   $4x = \dfrac{\log(425)}{\log(3)}$ □ $x = \dfrac{\log(425)}{4\log(3)} = \boxed{1.377}$

2. Change to Logarithmic Form □ $\log_3(425) = 4x$ □ $x = \dfrac{1}{4} \bullet \dfrac{\ln(425)}{\ln(3)} = \boxed{1.377}$

3. Solve: $e^{2x} - 4e^x - 5 = 0$
   Factor as if you would factor the left side of $w^2 - 4w - 5 = 0$, where w is acting as e^x.
   $(w - 5)(w + 1) = 0$. So in a similar way:
   $(e^x - 5)(e^x + 1) = 0$ □ $e^x = 5$ and $e^x = -1$
   $e^x = -1$ is not valid because you cannot raise a positive to a power and get a negative
   $e^x = 5$ can be solved where $\ln(5) = x = \boxed{1.609}$

4. Solve: $15e^{2x} - 4 = 17e^x$
   Again, This is like a quadratic equation where $w^2 - 4 = 17w$ and w is like e^x and w^2 is like e^{2x}.
   $15e^{2x} - 17e^x - 4 = 0$
   Ewell Method of Factoring: $(15e^x \quad)(15e^x \quad) = 0$
   We must find 2 numbers that: multiply to give -60 and add to give -17
   These numbers are -20 and +3 so we get $(15e^x - 20)(15e^x + 3) = 0$
   Factor out the commons and throw them away □ $(3e^x - 4)(5e^x + 1) = 0$
   $e^x = \dfrac{4}{3}$ and $e^x = -\dfrac{1}{5}$ The 2nd equation cannot exist because e^x cannot be negative.
   $\ln\left(\dfrac{4}{3}\right) = x$ □ $x = \boxed{0.288}$

5. Solve: $\log_x 17 = 5$
   Rewrite exponentially: $x^5 = 17$
   Take the 5th root of both sides: $x = 17^{1/5} = \boxed{1.762}$

Assignment 129
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