December 4

SWBAT:

Solve Log functions

Solve

$5^{x^2+1} = 57$

$\ln\left(5^{x^2+1}\right) = \ln(57)$

$\dfrac{(x^2+1)\ln(5)}{\ln(5)} = \dfrac{\ln(57)}{\ln(5)}$

$x^2+1 = \dfrac{\ln(57)}{\ln(5)}$

$-1 \qquad -1$

$x^2 = \dfrac{\ln(57)}{\ln(5)} - 1$

$x = \pm\sqrt{\dfrac{\ln(57)}{\ln(5)} - 1}$

$x = \pm 1.230$

Solve
$e^{2x}-4e^{x}-5=0$

$\ln(e^{2x}-4e^{x}-5)=\ln(0)$
↑undefined

$e^{2x}-4e^{x}-5=0$
$e^{2x}-4e^{x}=5$
$\ln(e^{2x}-4e^{x})=\ln(5)$

$e^{2x}-4e^{x}-5=0$
$\boxed{(e^{x})^2-4e^{x}-5=0}$ $(y=e^{x})$
$(e^{x}-5)(e^{x}+1)=0$

$e^{x}-5=0$
$+5 \quad +5$
$e^{x}=5$
$\ln(e^{x})=\ln(5)$
$x\cdot\ln(e)=\ln(5)$
$x=\ln(5)=1.609$

$e^{x}+1=0$
$-1 \quad -1$
$e^{x}=-1$ (no solution)
$\ln(e^{x})=\ln(-1)$
$x\cdot\ln(e)=\ln(-1)$
$x=\ln(-1)$
undefined

$\boxed{y^2-4y-5=0}$
$-5 \times 1 = -5$
$-5 + 1 = -4$
$y^2-5y+1y-5=0$
$y(y-5)+1(y-5)=0$
$(y-5)(y+1)=0$
$y-5=0 \quad y+1=0$
$y=5 \quad y=-1$

Solve
$e^{2x}-4e^{x}-5=0$

$\ln(e^{2x}-4e^{x}-5)=\ln(0)$
↑
undefined

$e^{2x}-4e^{x}-5=0$
$+5 \quad +5$
$e^{2x}-4e^{x}=5$
$\ln(e^{2x}-4e^{x})=\ln(5)$

$e^{2x}-4e^{x}-5=0$
$\boxed{(e^{x})^2-4(e^{x})-5=0}$ $y=e^{x}$
$(e^{x}-5)(e^{x}+1)=0$

$e^{x}-5=0$
$+5 \quad +5$
$e^{x}=5$
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$x=\ln(5)=1.609$

$e^{x}+1=0$
$-1 \quad -1$
$e^{x}=-1$ (no solution)
$\ln(e^{x})=\ln(-1)$
$x=$ undefined

$\boxed{y^2-4y-5=0}$
$(y-5)(y+1)=0$
$-5 + 1 = -4$
$-5 \times 1 = -5$
$y-5=0 \quad y+1=0$
$y=5 \quad y=-1$

Solve

$\ln(3x)=15$

$\log_e(3x)=15$

$\frac{e^{15}}{3}=\frac{3x}{3}$

$\frac{e^{15}}{3}=x$

$1{,}089{,}672.457=x$

$\ln(3x)=15$

$e^{\ln(3x)}=e^{15}$

$\frac{3x}{3}=\frac{e^{15}}{3}$

$x=\frac{e^{15}}{3}$

e^x is the inverse of $\ln x$

make both sides a power of e

Solve

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

$e^{\ln(x^2)}=e^{\frac{1}{4}}$

$x^2=e^{\frac{1}{4}}$

$x=\pm\sqrt{e^{\frac{1}{4}}}$

$x=\pm 1.133$

$16=\ln(3x)+\ln(5x)$

$16=\ln(3x\cdot 5x)$

$16=\ln(15x^2)$

$e^{16}=e^{\ln(15x^2)}$

$\frac{e^{16}}{15}=\frac{15x^2}{15}$

$\frac{e^{16}}{15}=x^2$

$\pm\sqrt{\frac{e^{16}}{15}}=x$