6.6 Solving Exponential Equations

Wednesday, June 19, 2019 1:45 PM

$5^{2x-4} = 25$

$5^{2x-4} = 5^2$ (match)

$2x-4 = 2$

$+4 \quad +4$

$\frac{2x}{2} = \frac{6}{2}$

$x = 3$

vs. $5^{2x-4} = \log_5 18$

$2x-4 = \log_5(18) \leftarrow \frac{\log(18)}{\log(5)}$

$2x-4 = 1.80$

$+4 \quad +4$

$\frac{2x}{2} = \frac{5.80}{2}$

$x = 2.90$

ex $e^{4x-5} + 2 = 12$

$-2 \quad -2$

$\ln e^{4x-5} = \ln 10$

$4x-5 = 2.30$

$+5 \quad +5$

$\frac{4x}{4} = \frac{7.30}{4}$

$x = 1.83$

Steps:

1. Isolate the exponential
2. Apply logs to both sides (need to match the base # of the exponential)
3. Solve for x
4. Check solution

ex $2 \cdot 3^{x+1} - 6 = 4$

$+6 \quad +6$

① $\frac{2 \cdot 3^{x+1}}{2} = \frac{10}{2}$

② $\log_3 3^{x+1} = \log_3 5$

$x+1 = \log_3(5) \leftarrow \frac{\log(5)}{\log(3)}$

③ $x+1 = 1.46$

$-1 \quad -1$

$x = 0.46$

④ $2 \cdot 3^{(0.46)+1} - 6 \stackrel{?}{=} 4$

ex Deposit $500 6.75% interest (0.0675) compounded continuously

How long would it take for our money to double?

~~$A = P(1 + \frac{r}{n})^{nt}$~~

$A = P \cdot e^{rt}$

$\$1{,}000 = \$500 \cdot e^{0.0675 \cdot t}$

$\frac{1{,}000}{500} = \frac{500}{500} e^{0.0675 \cdot t}$

$\ln 2 = \ln e^{0.0675 \cdot t}$

$\frac{0.69}{0.0675} = \frac{0.0675 \cdot t}{0.0675}$

10.27 years = t

ex Deposit $2,800 6.75 interes

How long would it

our money to d

$A = P \cdot e^{rt}$

$\$5{,}600 = \$2{,}800 e$

$\frac{5{,}600}{2{,}800} = \frac{2{,}800}{2{,}800} e^{0.067}$

$2 = e^{0.067}$

10.27 years

5% compounded
st continuously

take for
ouble?

.0675 t

75 t

= t

Deposit some $$$ 6.75% continuously

How long will it take for $ to double?

$A = Pe^{rt}$

$\ln 2 = \ln e^{0.0675t}$

10.27 years

Triple?

$\ln 3 = 0.0675t$

$\frac{\ln 3}{0.0675} = \frac{0.0675}{0.0675}t$

16.28 years