

Natural Exponent

* the base is $e \approx 2.71$
→ irrational

Solving exponents

* once they have the same bases, just look at exponents

ex 1 solve for x

$$\begin{aligned} \text{a) } 3^x &= 27 \\ 3^x &= 3^3 \\ \boxed{x=3} \end{aligned}$$

$$\begin{aligned} \text{b) } 2^{x-4} &= 16 \\ 2^{x-4} &= 2^4 \\ x-4 &= 4 \\ \boxed{x=8} \end{aligned}$$

$$\begin{aligned} \text{c) } \left(\frac{1}{2}\right)^x &= 16^{x-5} \\ 2^{-x} &= 2^4(x-5) \\ -x &= 4(x-5) \\ -x &= 4x-20 \\ -5x &= -20 \\ \boxed{x=4} \end{aligned}$$

$$\begin{aligned} \text{d) } 2^{x^2+4} &= 2^{5x} \\ x^2+4 &= 5x \\ x^2-5x+4 &= 0 \\ (x-4)(x-1) &= 0 \\ \boxed{x=4, 1} \end{aligned}$$

$$\begin{aligned} \text{e) } 5^{x^2+30} &= 5^{11x} \\ x^2+30 &= 11x \\ x^2-11x+30 &= 0 \\ (x-6)(x-5) &= 0 \\ \boxed{x=6, 5} \end{aligned}$$

interest problems

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

$$A = Pe^{rt}$$

P → principle \$

r → rate in decimal

n → # of times compounded

t → time

ex 2 \$1500, ~~10%~~
r=7%
compound monthly
5 yrs

$$A = 1500 \left(1 + \frac{0.07}{12}\right)^{12(5)} = \boxed{\$2126.44}$$

ex 3 \$1200 compounded continuously
at 6%, 4 yrs
• $e^{0.6(4)}$

$$A = 1200e^{0.6(4)} \\ \boxed{A = \$1525.50}$$