

Solving Exponential Equations

1. Isolate the exponential part of the equation (the part that has a variable in the exponent)
2. Rewrite the equation by "taking the ln of both sides" using the property $a^x \rightarrow \ln(a^x) \rightarrow x \ln a$ to get the variable out of the exponent
3. Solve the remaining equation for the variable, using your calculator to evaluate any ln terms

Ex) Solve $\sqrt{3^{x+2}} = 18$

$$\ln 3^{x+2} = \ln 18$$

$$(x+2) \ln 3 = \ln 18$$

$$x+2 = \frac{\ln 18}{\ln 3}$$

$$x = \frac{\ln 18}{\ln 3} - 2$$

$$x = .63$$

✓ Ex) $5^{2x} = \frac{1}{5^x}$

$$11. 5^{2x} = 5^{-x}$$

$$2x = -x$$

$$3x = 0$$

$$x = 0$$

✓ Ex) $1 + 6^{2x-1} = 10$

$$6^{2x-1} = 9$$

$$\ln 6^{2x-1} = \ln 9$$

$$(2x-1) \ln 6 = \ln 9$$

$$2x-1 = \frac{\ln 9}{\ln 6}$$

$$2x = \frac{\ln 9}{\ln 6} + 1$$

$$x = \frac{\frac{\ln 9}{\ln 6} + 1}{2}$$

$$x = 1.1$$

Solving Other Kinds of Equations

Polynomials

- Quadratics ($ax^2 + bx + c$) $\rightarrow$ factor or use the quadratic formula
- Polynomials with no powers larger than 1 $\rightarrow$ get x by itself on one side!

Solve the following for x. ✓ a) $x^2 - 2x - 3 = 0$

$$(x-3)(x+1) = 0$$

$$x = 3 \quad x = -1$$

✓ b) $x^2 + x - 4 = 0$

$$-1 \pm \sqrt{1^2 - 4(1)(-4)}$$

$$\frac{-1 \pm \sqrt{1+16}}{2(1)}$$

$$= \frac{-1 \pm \sqrt{17}}{2}$$

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$$\begin{aligned} a &= 1 \\ b &= 1 \\ c &= -4 \end{aligned}$$

✓ c) $-5(1+3x) = -24 + 4x$

$$-5 - 15x = -24 + 4x$$

$$19 = 19x$$

$$x = 1$$

✓ d) $3x^2 + 6x + 6 = 0$

$$a=3 \quad b=6 \quad c=6$$

$$\frac{-6 \pm \sqrt{6^2 - 4(3)(6)}}{2(3)}$$

$$\frac{-6 \pm \sqrt{36 - 72}}{6}$$

$$\frac{-6 \pm \sqrt{-36}}{6}$$

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$$\frac{-6 \pm \sqrt{-36}}{6} = -1 \pm i$$

*Complex
to
this*