

9.8 Solving Equations by Factoring

Finding the "Zeros of a function"...

Up until now our polynomials have been just polynomials, but sometimes functions/equations are polynomials and need to be solved.

Polynomial functions may look like $y = -16x^2 + 48x$
 * Note the $y =$ or $f(x) =$ $f(x) = -16x^2 + 48x$

When finding the zeros, we are setting the polynomial equal to zero and finding the corresponding x-values.

Zero Product Property

* If $ab=0$, then either $a=0$ or $b=0$

What this means is that if we break our polynomial into factors, then one of the factors has to be zero.

Let's say $y = (x+2)(x-3)$,
 then $x+2=0$ or $x-3=0$
 $x=-2$ or $x=3$] What values of x give us $y=0$

Sometimes we need to factor first...

note function \rightarrow $y = -16x^2 + 48x$
 equal to 0.
 $0 = -16x^2 + 48x$
 $0 = -16x(x-3)$

* Must be = 0, if not, move things around.

$0 = (-16x)(x-3)$ so... $-16x=0$ or $x-3=0$
 $x=0$ or $x=3$

Ex: $f(x) = x^2 + 5x - 24$
 $0 = x^2 + 5x - 24$
 $0 = (x-3)(x+8)$
 so

$\begin{array}{r} -24 \\ 1, 24 \\ 2, 12 \\ -3, 8 \end{array}$

$x-3=0$ or $x+8=0$
 $x=3$ or $x=-8$

Ex: $0 = 4x^2 + x - 5$

$a \neq 1$

$4x^2 - 4x + 5x - 5$
 $4x(x-1) + 5(x-1)$
 $(4x+5)(x-1)$

$\begin{array}{r} -20 \\ +5, -4 \end{array}$

$4x+5=0$ or $x-1=0$
 $x=-\frac{5}{4}$ or $x=1$