Equations and Graphs of Polynomial Functions

Date:

Quadratic Function

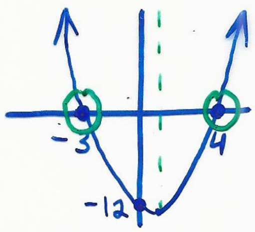
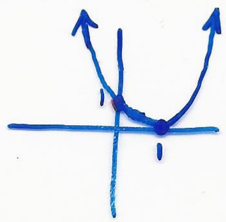
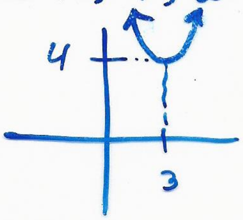
standard form: $f(x)=ax^2+bx+c$

There could be 0, 1, or 2 real roots

factored form: $f(x)=k(x-s)(x-t)$

$y=x^2-6x+9-9+13$

$y=(x-3)^2+4$

Function	$f(x)=x^2-x-12$, $a=1$	$f(x)=x^2-2x+1$, $a=1$	$f(x)=x^2-6x+13$
Sketch	$y=(x-4)(x+3)$ 	$y=(x-1)^{2}$ x-int $x=1$ 	Not factorable! Comp. the square! Vertex $(3,4)$; $a=1>0$ 
number of *x* intercepts	2 x-intercepts (both real)	1 x-intercept of order 2	0 x-intercepts $i=\sqrt{-1}$
Type of roots of the related equation, $f(x)=0$	$0=(x-4)^1(x+3)^1$ $x-4=0$ or $x+3=0$ $x=4$ or $x=-3$ 2 real distinct x-intercepts/roots both factors have order of 1	$0=(x-1)^2$ $x-1=0$ or $x-1=0$ $x=1$ or $x=1$ the root occurs twice! 2 real equal roots	$0=x^2-6x+13$ has no real solutions means $D<0$ $x_{1,2}=\frac{-(-6)\pm\sqrt{(-6)^2-4(1)(13)}}{2(1)}$ $x_{1,2}=\frac{6\pm\sqrt{-16}}{2}=\frac{6\pm\sqrt{(-1)(16)}}{2}$ $x_{1,2}=\frac{6\pm4i}{2}$ $x_{1,2}=3\pm2i$ ← 1 pair of complex conjugates
# of turning points	one turning point	one	
# of local max and mins	one local minimum which is also global	one local min one global min (the same)	one local min which is also one global min.

Remark!
At the x-intercept of order 2 the function does not cross the x-axis but touches it (no change of sign occurs!)