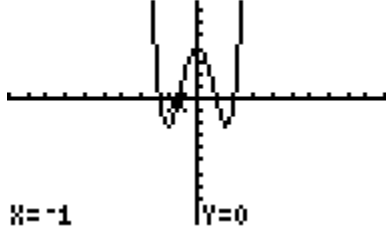


Quartic Functions and Roots

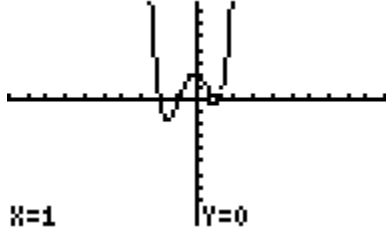
Positive

$$Y1=(X+1)(X+2)(X-1)(X-2)$$



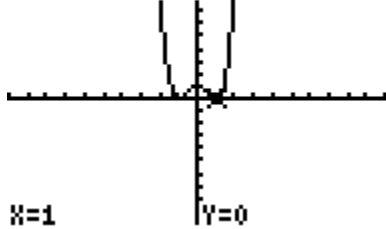
4 different real roots

$$Y1=(X+1)(X+2)(X-1)^2$$



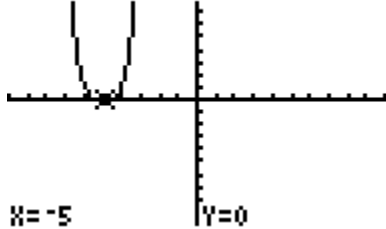
2 different real roots
2 equal real roots

$$Y1=(X+1)^2(X-1)^2$$



2 pairs of equal roots

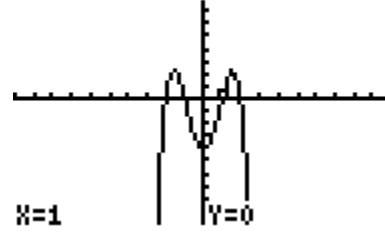
$$Y1=(X+5)^2(X+5)^2$$



4 equal real roots

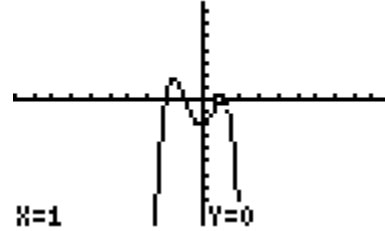
Negative

$$Y1=-(X+1)(X+2)(X-1)(X-2)$$

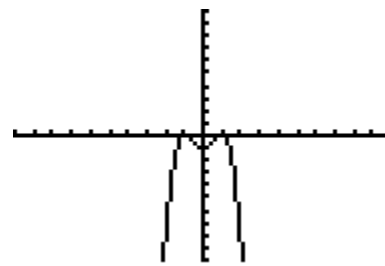


4 different real roots

$$Y1=-(X+1)(X+2)(X-1)^2$$

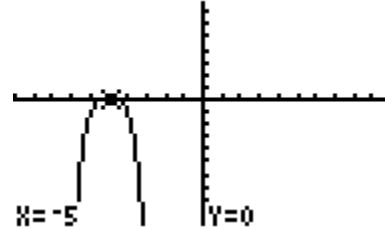


2 different real roots
2 equal real roots



2 pairs of equal roots

$$Y1=-(X+5)^2(X+5)^2$$

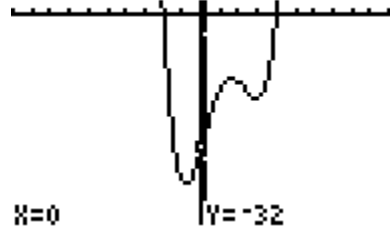


4 equal real roots

Quartic Functions and Roots

Positive

$$Y1=(X-4)(X+2)(X^2-3X+4)$$



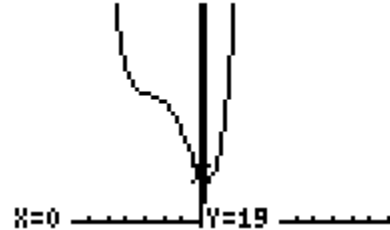
2 different real roots
2 complex roots

$$Y1=(X+2)^2(X^2-3X+4)$$



2 equal real roots
2 complex roots

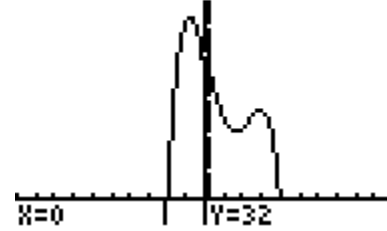
$$Y1=(X^2-X+1)(X^2+8X+19)$$



4 complex roots

Negative

$$Y1=-(X-4)(X+2)(X^2-3X+4)$$



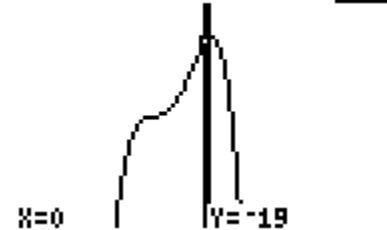
2 different real roots
2 complex roots

$$Y1=-(X+2)^2(X^2-3X+4)$$



2 equal real roots
2 complex roots

$$Y1=-(X^2-X+1)(X^2+8X+19)$$



4 complex roots