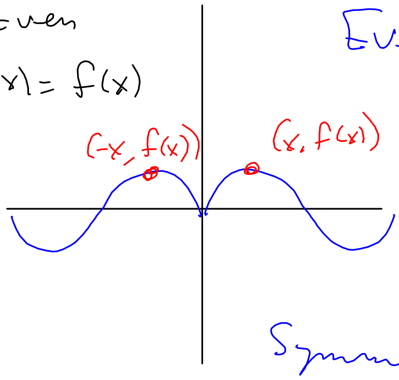
Even

$f(-x) = f(x)$



Even powers

sums of even powers

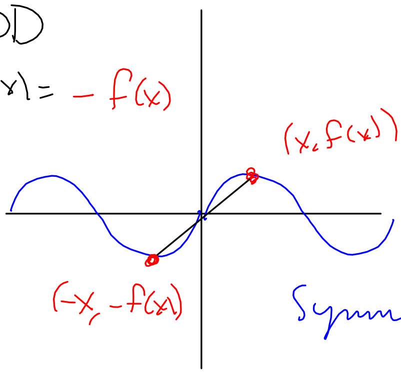
$f(x) = 7 = 7x^0$

$f(x) = 7x^4 - 5x^2 + 982$

Symmetry thru the y-axis

ODD

$f(-x) = -f(x)$



ODD Powers:

x, x^3, x^5 & sums of odd powers

$x^5 - 2x^3 + 11x$

Symmetry thru the origin.

Neither: $x^4 + x^3 - 17x^2 + 5x - 1$

$$\frac{x^4 + 5x^2 + 7}{x^3 + 4x}$$

EVEN: +

ODD: −

$$\frac{\text{EVEN}}{\text{ODD}} = \frac{+}{-} = - = \text{Odd.}$$

1. (10 pts) Form a polynomial of *minimal degree* in *factored form* that has real coefficients (after expanding) and will have the given zeros. Do *not* expand your polynomial. Leave it factored! If you run out of room, you're doing it wrong!

$x = 5 - 3i$, multiplicity 1; $x = 3$, multiplicity 4; $x = -5$, multiplicity 2.

$$(x-(5-3i))\boxed{(x-(5+3i))}(x-3)^4(x-(-5))^2 = f(x)$$

Conjugate Pairs Theorem:

$$f(a+bi) = 0 \implies f(a-bi) = 0$$

$$a+bi = 0$$

$$x^2+5x+10 = x^2+5x+\left(\frac{5}{2}\right)^2 - \frac{25}{4} + (10)\left(\frac{4}{4}\right)$$

$$= \left(x+\frac{5}{2}\right)^2 + \frac{15}{4} \overset{SET}{=} 0 \qquad a+bi = z$$

$$\implies \left(x+\frac{5}{2}\right)^2 = -\frac{15}{4} \qquad \implies \text{conjugate is } a-bi = \bar{z}$$

$$\implies x+\frac{5}{2} = \pm\sqrt{\frac{-15}{4}} = \pm i\frac{\sqrt{15}}{2}$$

$$x = \frac{-5 \pm i\sqrt{15}}{2} \qquad \begin{matrix} -5+\sqrt{15}\, i \\ -5-\sqrt{15}\, i \end{matrix}$$