How would you factor this?

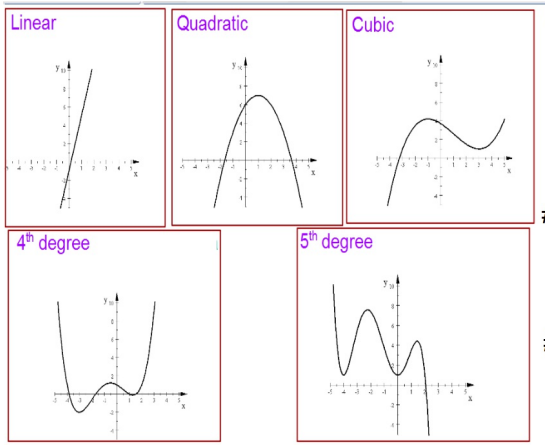
$x^3 + 6x^2 - 3x - 18$

Place these four terms in the box and factor as usual

$(x+6)(x^2-3)$

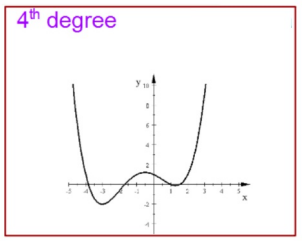
	x	$+6$
x^2	x^3	$+6x^2$
-3	$-3x$	-18

Polynomial Functions



	Even:	Odd:
Domain:	All Real Numbers	All Real Numbers
Range:	$y \le$ Abs Max or $y \ge$ Abs Min	All Real Numbers
# x-int(s):	From zero up to the degree	At least one and up to the degree
# y-int(s):	Exactly One	Exactly One

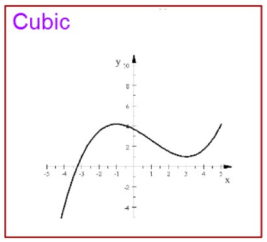
Even Function:



Domain: All Real Numbers

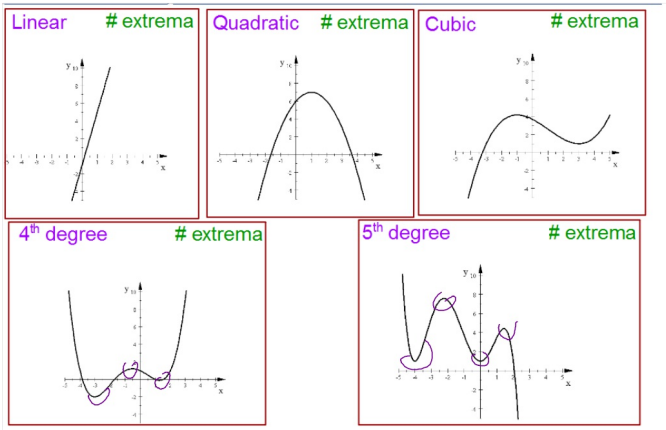
Range: $y \ge -2$

Odd Function:



Domain: All Real Numbers

Range: All Real Numbers



Degree	# of Extrema
1	0
2	1
3	2
4	3
5	4

A polynomial can have up to n -1 extrema (n = degree of the polynomial)

X - Intercepts -- Can have up to n x-intercepts.
n = degree of polynomial

EVEN Functions may have no x-intercept and up to n x-intercepts.
ODD Functions must have at least 1 x-intercept and up to n x-intercepts

Y - intercepts -- All polynomials have exactly ONE y-intercept.

Expand each:

1. $(x^2 - 7)(x^2 + 7)$

$x^4 - 49$

2. $(x^2 - 5)(x^2 + 6)$

$x^4 + 1x^2 - 30$

Factor each:

3. $x^4 - 16$

4. $x^4 - 10x^2 + 24$

$(x^2-6)(x^2-4)$

$(x^2-6)(x+2)(x-2)$

24, −6, −4, −10

Since 6 is not a perfect square you can't factor this any further.

Factor each:

3. $x^4 - 16$

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

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

x^2

Factor using a Quadratic Pattern

This is how our textbook explains the process

4. $x^4 - 10x^2 + 24 = (x^2)^2 - 10(x^2) + 24$

Substitute a for x^2 $a^2 - 10a + 24$

24, −6, −4, −10

$(a - 4)(a - 6)$

Substitute x^2 back in for a $(x^2 - 4)(x^2 - 6)$

$(x + 2)(x - 2)(x^2 - 6)$

Factor this polynomial completely.

$x^4 + 6x^2 - 7$

$(x^2+7)(x^2-1)$

$(x^2+7)(x+1)(x-1)$

5. Find all real and imaginary (complex) solutions by factoring

a) $x^4 - 81 = 0$

$(x^2+9)(x^2-9)$

$(x^2+9)(x+3)(x-3)$

$x^2+9=0 \quad \sqrt{x^2}=\sqrt{-9}$

$x+3=0$

$x-3=0$

$x = \pm 3, \pm 3i$

b) $x^4 - 64 = 0$

$(x^2+8)(x^2-8)$

$x^2+8=0$

$\sqrt{x^2}=\sqrt{-8}$

$\pm 2i\sqrt{2}$

$x^2-8=0$

$\sqrt{x^2}=\sqrt{8}$

$\pm 2\sqrt{2}$

6. Find all real and imaginary (complex) solutions by factoring

a) $x^4 - 5x^2 - 36 = 0$

-36, -9, $+4$, -5

$(x^2-9)(x^2+4)=0$

$(x+3)(x-3)(x^2+4)=0$

$x+3=0 \quad x-3=0 \quad x^2+4=0$

$x = -3, 3, \pm 2i$

b) $x^4 + x^2 - 42 = 0$

Hwk #27:

Pages 330-331

Problems: 22-25, 29, 30

this is a correction