$z^3+125=0$

$(z+5)(z^2-5z+25)=0$

$z+5=0$ $\quad z^2-5z+25=0$

$z=-5$

$z=\frac{5\pm\sqrt{25-4(1)(25)}}{2\cdot1}$

$z=\frac{5\pm\sqrt{-75}}{2}$

$z=\frac{5\pm5i\sqrt{3}}{2}$

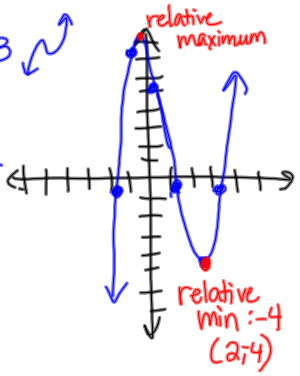
$z^3+125=0$
$-125\quad -125$
$z^3=-125$
$z=-5$

Solve by graphing

EB

$x^3-2x^2-5x=-6$
$+6\quad +6$
$x^3-2x^2-5x+6=0$

x	y	
0	6	
1	0	$1-2-5+6$
2	−4	$8-8-10+6$
3	0	$27-18-15+6$
−1	8	$-1-2+5+6$
−2	0	$-8-8+10+6$



$x=-2,1,3$

Graph $x^3-2x^2+5x=0$

$x(x^2-2x+5)=0$

$x(x-1)(x-5)=0$

$x=0,1,5$

$x^4-10x^2=-9$

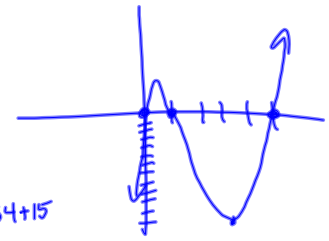
$+9\quad +9$

$x^4-10x^2+9=0$

$(x^2-1)(x^2-9)=0$

$(x+1)(x-1)(x+3)(x-3)=0$

$x=-1,1,-3,3$



3 | 1 −2 −5 +6
3 | 3 −6 −33
1 −2 −11 −27

Quadratic Form

au^2+bu+c

$x^2-1=0$ $\quad x^2-9=0$

$x^2=1$ $\quad x^2=9$

$x=\pm1$ $\quad x=\pm3$

$u=x^2=\frac{-b\pm\sqrt{b^2-4ac}}{2a}$

Apr 14-9:37 AM

twins born one yr after sister

product of ages is 5150 more than sum

twins' age: t

sister's age: $s = t+1$

$t \cdot t \cdot (t+1) = t + t + (t+1) + 5150$

$t^2(t+1) = 3t + 1 + 5150$

$t^3 + t^2 = 3t + 5151$

$-3t - 5151 \quad -3t - 5151$

$t^3 + t^2 - 3t - 5151 = 0$

Guess & Check

10: $10^3 + 10^2 - 3 \cdot 10 - 5151$

$1000 + 100 - 30 - 5151 < 0$

20: $20^3 + 20^2 - 3 \cdot 20 - 5151$

$8000 + 400 - 60 - 5151$

$8400 - 5211 > 0$

15: $15^3 + 15^2 - 3 \cdot 15 - 5151$

$3375 + 225 - 45 - 5151 < 0$

18: $18^3 + 18^2 - 3 \cdot 18 - 5151$

$5832 + 324 - 54 - 5151$

$6156 - 5205 > 0$

17: $17^3 + 17^2 - 3 \cdot 17 - 5151$

$4913 + 289 - 51 - 5151$

$5202 - 5202 = 0$

Apr 14-10:40 AM

Sec. 5.4 Dividing Polynomials

Divide using long division

$(3x^3+9x^2+8x+4) \div (x+2)$ → Is this a factor of $3x^3+9x^2+8x+4$?

$3x^2+3x+2$ → factor

$x+2 \overline{)\,3x^3+9x^2+8x+4}$

$-3x^3-6x^2$ CHANGE SIGNS

$3x^2+8x$

$-3x^2-6x$

$2x+4$

$-2x-4$

0 → Yes, $x+2$ is a factor.

SYNTHETIC ÷

$-2 \mid 3 \;\; 9 \;\; 8 \;\; 4$

$\downarrow \;\; -6 \;\; -6 \;\; -4$

$3 \;\; 3 \;\; 2 \;\; 10$

Ex: $(5x^2+2x+3) \div (x+1)$ Dividend, Divisor

Quotient $5x-3$

$x+1 \overline{)\,5x^2+2x+3}$

$-5x^2+5x$

$-3x+3$

$+3x+3$

R 6

$5x-3+\frac{6}{x+1}$ Rem. / Divisor

Ex: Is x^2-1 a factor of $3x^4-4x^3+12x^2+5$?

$3x^2-4x+15+\frac{-4x+20}{x^2-1}$

$x^2-1 \overline{)\,3x^4-4x^3+12x^2+0x+5}$

$-3x^4+0x^3+3x^2$

$-4x^3+15x^2+0x+5$

$+4x^3+0x^2-4x$

$15x^2-4x+5$

$-15x^2+0x+15$

$-4x+20$

No, not a factor