Put it in!

C12 - 3.0 - Polynomials Review

Graph and find x-intercepts

Synthetic

Steps:
Bring Down
Multiply
Add
Repeat last two steps

a | $Synthetic = f(a) = x - int\ (a, 0)$
$R = 0$ $\quad Factor = (x - a)$

Ascending Order

The x intercept, the thing you put into synthetic division and $f(\ )$ is all the same.

The factor is the only opposite

Insert 0 if you are missing a degree term $x^3 + 0x^2 - 2x + 4$

If you are going to put the opposite sign of the x intercept into synthetic division, you must subtract

Potential Factors

$$= \frac{\pm factors\ of\ e^*}{\pm factors\ of\ a}$$

Solve by Inspection

$f(a) = 0$

$(x - a);\ is\ a\ factor$

$f(a) = R$

$(x - a);\ is\ not\ a\ factor$

Store x/Graph Calc Zeros

x-intercepts

$x - 2 = 0$
$x = 2$

$x - int$: $(2,0)$

y-intercept

$(0, y)$

End behavior

$\pm x^{even}, \pm x^{odd}$

$x \to +\infty \quad x \to -\infty$
$y \to \pm\infty \quad y \to \pm\infty$

End Bev
$y = (1 - x)^2(x + 2) = +x^{odd}$
$y = (1 - x)^3(x + 2) = -x^{even}$

Multiplicity **Degree**

$(x - 2)^1(x - 1)^2(x + 3)^3$

TOV

x	y

Calc: 1 | STO | x | Enter

$2x^3 - 27x^2 + 90x - 81 = -16$

2 | STO | x | Enter

TI84 Up, Up, Up, Up | Enter

TI83 2nd | Entry | 2nd | Entry | Enter

$2x^3 - 27x^2 + 90x - 81 = 7$

OR Graph it! OR in your Head

Long Division

Steps:
Goes Into
Multiply
Subtract
Bring Down
Repeat

Divisors
-Binomials Coefficient≠ 1
-Trinomials etc. Quadratic
Use Long Division

$Factored/Standard\ Form$

$y = a(x - \#)^1(x - \#)^2(x - \#)^3 \ldots$
$y = ax^4 + bx^3 + cx^2 + dx + e$

$e = y - int$

	$x \in R$	$x \in R$
	x^{even}	x^{odd}
Max number of x-intercepts	Degree	Degree
Min number of x-intercepts	0	1
Max number of turns	Degree -1	Degree -1
Min number of turns	1	0*

$Min\ Degree = \#\ turns + 1$
$Max\ \#\ Turns = Degree - 1$

$y \geq min \quad y \in R$
$y \leq max$

$y = 5 = 5x^0;$ $\quad Constant$
$y = 2x;$ $\quad Linear$
$y = -x^2;$ $\quad Quadratic$
$y = 5x^3;$ $\quad Cubic$
$y = -2x^4;$ $\quad Quartic$
$y = 2x^5;$ $\quad Quintic$
$Heptic, Septic, Octic, Nonic, Decec?$

C12 - 3.0 - Long/Synthetic Division $R = 0$ Review

$x + 3 \overline{)\, x^2 + 5x + 6}$

$\frac{x^2 + 5x + 6}{x + 3} = ?$

x *times what is* $x^2 = x$

x

$x + 3 \overline{)\, x^2 + 5x + 6}$

Goes Into
Multiply
Subtract
Bring Down
Repeat

x

$x + 3 \overline{)\, x^2 + 5x + 6}$

$x^2 + 3x$

$x \times x = x^2, 3 \times x = 3x$

The 3 is only for multiplication

x

$x + 3 \overline{)\, x^2 + 5x + 6}$

$x^2 + 3x$

$2x + 6$

$5x - 3x = 2x$, *Bring down* $+ 6$

x *times what is* $+2x = +2x$

$x + 2$

$x + 3 \overline{)\, x^2 + 5x + 6}$

$x^2 + 3x$

$2x + 6$

$x + 2$

$x + 3 \overline{)\, x^2 + 5x + 6}$

$x^2 + 3x$

$2x + 6$

$2x + 6$

$x \times 2 = 2x, 3 \times 2 = 6$

$x + 2$

$x + 3 \overline{)\, x^2 + 5x + 6}$

$x^2 + 3x$

$2x + 6$

$2x + 6$

0

$6 - 6 = 0$

Remainder

$-3 \mid 1 \quad 5 \quad 6$

$+$

$x + 3 = 0$

$x = -3$

Set denominator equal to zero and solve.

Denominator $= 0$

$1x^2 + 5x + 6$

Bring Down
Multiply, Add, Repeat

$-3 \mid 1 \quad 5 \quad 6$

$+$

List Coefficients

$-3 \mid 1 \quad 5 \quad 6$

$+$

1

Bring down the first coefficient

$-3 \mid 1 \quad 5 \quad 6$

$+ \quad -3$

1

$-3 \times 1 = -3$

$-3 \mid 1 \quad 5 \quad 6$

$+ \quad -3$

$1 \quad 2$

$5 + (-3) = 2$

$-3 \mid 1 \quad 5 \quad 6$

$+ \quad -3 \quad -6$

$1 \quad 2$

$-3 \times 2 = 6$

$-3 \mid 1 \quad 5 \quad 6$

$+ \quad -3 \quad -6$

$1 \quad 2 \quad 0$

$6 + (-6) = 0$

$1x + 2$

Remainder

The exponents of x go down by one.

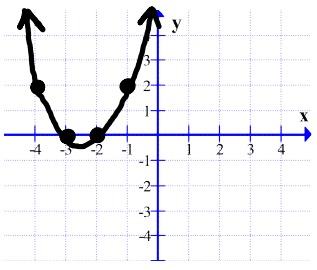
Factor Theorem

$f(x) = x^2 + 5x + 6$

$f(-3) = (-3)^2 + 5(-3) + 6$

$f(-3) = 0$

$(-3, 0)$



C12 - 3.0 - Long/Synthetic Division $R = \#$ Review

$x+3\overline{)\,x^2+5x+9}$

$\frac{x^2+5x+9}{x+3} = ?$

-3 | 1 5 9
+

x *times what is* $x^2 = x$

x

$x+3\overline{)\,x^2+5x+9}$

Goes Into
Multiply
Subtract
Bring Down
Repeat

$x+3=0$ Set denominator equal to zero and solve.

$x=-3$ *Denominator* $= 0$

$1x^2+5x+9$

Bring Down
Multiply, Add, Repeat

-3 | 1 5 9 List Coefficients
+

x

$x+3\overline{)\,x^2+5x+9}$

x^2+3x

$x \times x = x^2, 3 \times x = 3x$

The 3 is only for multiplication

-3 | 1 5 9
+
1

Bring down the first coefficient

x

$x+3\overline{)\,x^2+5x+9}$

x^2+3x

$2x+9$

$5x-3x=2x$, *Bring down* $+9$

-3 | 1 5 9
+ | -3
1

$-3 \times 1 = -3$

x times what is $+2x = +2$

$x+2$

$x+3\overline{)\,x^2+5x+9}$

x^2+3x

$2x+9$

-3 | 1 5 9
+ | -3
1 2

$5+(-3)=2$

$x+2$

$x+3\overline{)\,x^2+5x+9}$

x^2+3x

$2x+9$

$2x+6$

$x \times 2 = 2x, 3 \times 2 = 6$

-3 | 1 5 9
+ | -3 -6
1 2

$-3 \times 2 = 6$

$x+2$

$x+3\overline{)\,x^2+5x+9}$

x^2+3x

$2x+9$

$2x+6$

3 $9-6=3$

Remainder

-3 | 1 5 9
+ | -3 -6
1 2 3

$9+(-6)=3$

$1x+2$

Remainder

The exponents of x go down by one.

Remainder Theorem

$f(x) = x^2+5x+6$

$f(-3) = (-3)^2+5(-3)+9$

$f(-3) = 3$

$(-3,3)$