15

$f(x) = 3x^4 + 5x^3 + 81x + 135$ $x = -\frac{5}{3}$

$= (3x+5)(3x^3+81)$

$= (3x+5)(3)(x^3+27)$

$$\begin{array}{r|rrrrr} -\frac{5}{3} & 3 & 5 & 0 & 81 & 135 \\ & & -5 & 0 & 0 & -135 \\ \hline & 3 & 0 & 0 & 81 & \boxed{0} \end{array}$$

$$\begin{array}{r|rrrr} -3 & 1 & 0 & 0 & 27 \\ & & -3 & 9 & -27 \\ \hline & 1 & -3 & 9 & \boxed{0} \end{array} \checkmark$$

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

$x = -\frac{5}{3}$ $x = -3$

$x = \frac{3 \pm \sqrt{9 - 4(1)(9)}}{2(1)}$

$x = \frac{3 \pm \sqrt{9-36}}{2}$

$x = \frac{3 \pm \sqrt{-27}}{2}$

$x = \frac{3 \pm 3i\sqrt{3}}{2}$

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17 $f(x) = 10x^3 - 41x^2 + 32x + 20$

$$\begin{array}{r|rrrr} \frac{5}{2} & 10 & -41 & 32 & 20 \\ & & 25 & & \\ \hline & 10 & & & \boxed{} \end{array}$$

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(16)

$$\begin{array}{r|rrrrr} -3 & 2 & -1 & -18 & 9 & 0 \\ & \downarrow & -6 & 21 & -9 & 0 \\ \hline & 2 & -7 & 3 & 0 & \boxed{0} \end{array}$$

$2x^3 - 7x^2 + 3x + 0$

$f(x) = (x+3)(x)(2x^2 - 7x + 3)$

$x = -3$ | 0 | $x^2 - 7x + 6$

$(x - \frac{6}{2})(x - \frac{1}{2})$

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

$x = 3$ | $x = \frac{1}{2}$

Nov 19-12:49 PM

Bell  Ringer

What is the basic shape of y = f(x) when f(x) = $x^4+2x^3-3x^2-8x-4$

$\pm 4 \ \pm 2 \ \pm 1$

Now find the roots f(x).

$$\begin{array}{r|rrrrr} 2 & 1 & 2 & -3 & -8 & -4 \\ & \downarrow & 2 & 8 & 10 & 4 \\ \hline & 1 & 4 & 5 & 2 & \boxed{0} \end{array}$$

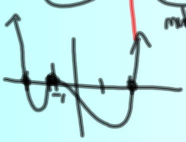
$f(x) = (x-2)(x^3 + 4x^2 + 5x + 2)$ $\pm 1 \ \pm 2$

$$\begin{array}{r|rrrr} -1 & 1 & 4 & 5 & 2 \\ & \downarrow & -1 & -3 & -2 \\ \hline & 1 & 3 & 2 & \boxed{0} \end{array}$$

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

$f(x) = (x-2)(x+1)(x+1)(x+2)$

$x=2$ | $x=-1$ mult 2 | $x=-2$



Oct 8-9:46 PM

Use the Remainder Theorem to determine whether $x = 2$ is a zero of $f(x) = 3x^7 - x^4 + 2x^3 - 5x^2 - 4$

$$\begin{array}{r|rrrrrrrr} 2 & 3 & 0 & 0 & -1 & 2 & -5 & 0 & -4 \\ \hline & 3 & & & & & & & \end{array}$$

So basically...

NO!

2	3	0	0	−1	2	−5	0	−4
		6	12	24	46	96	182	364
	3	6	12	23	48	91	182	360

Oct 12-7:27 PM

Using the Remainder Theorem, find the value of $f(-5)$, for $f(x) = 3x^4 + 2x^3 + 4x$

$$\begin{array}{r|rrrrr} -5 & 3 & 2 & 0 & 4 & 0 \\ & & -15 & 65 & -325 & 1605 \\ \hline & 3 & -13 & 65 & -321 & \boxed{1605} \end{array}$$

$$\boxed{\therefore f(-5) = 1605}$$

−5	3	2	0	4	0
		−15	65	−325	1605
	3	−13	65	−321	1605

Oct 12-7:27 PM

Real Roots

Complex Roots (imaginary)

rational	irrational
can come alone or in pairs	always come in pairs
ex $x=2$, $x=0$, $x=\pm 3$	ex) $\pm\sqrt{2}$ ex) $3\pm\sqrt{5}$

Complex Roots: always come in pairs

ex) $1\pm 5i$

$\pm 47i$

$\pm i$

Nov 19-11:54 AM

Given Roots

$x=3$ $x=\sqrt{5}$ $x=-2$

this one must also be there → $x=-\sqrt{5}$

$$f(x)=(x-3)(x+2)(x-\sqrt{5})(x+\sqrt{5})$$

Nov 19-1:12 PM

Given Roots

$x=1$, $2+\sqrt{3}$, $2-\sqrt{3}$

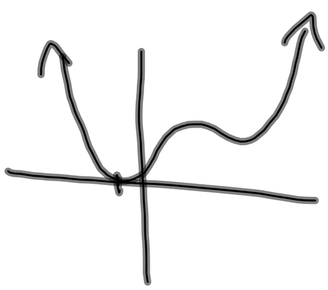
then this one is implied

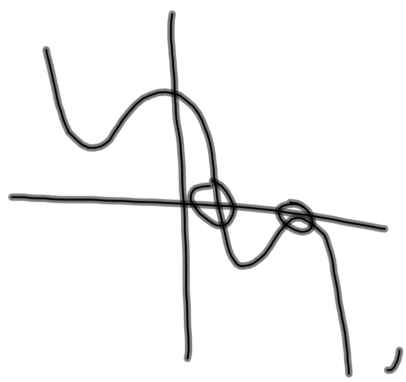
$$f(x) = (x-1)(x-(2+\sqrt{3}))(x-(2-\sqrt{3}))$$

$$f(x) = (x-1)(x-2-\sqrt{3})(x-2+\sqrt{3})$$

Nov 19-1:15 PM

$x^4 \ldots\ldots$ $\quad$ $-x^5 \ldots$





Nov 19-1:16 PM