Questions on polynomial long division from Lesson 6.2?

No quiz today, but we need to take our first Illuminate interim assessment.

$$\frac{s}{\sqrt{n}} \qquad \sqrt{\frac{\hat{p}(1-\hat{p})}{n}}$$

Feb 27-8:47 AM

$$\left(35n^3 + 7n^2 + 25n\right) \div \left(5n + 1\right)$$

$$\begin{array}{r} 7n^2 + 5 \\ 5n+1 \enclose{longdiv}{35n^3 + 7n^2 + 25n + 0} \\ -(35n^3 + 7n^2) \quad \downarrow \quad \downarrow \\ 0 \quad + 25n + 0 \\ -(25n + 5) \\ \boxed{-5} \end{array}$$

Answer: $7n^2 + 5 - \frac{5}{5n+1}$

$$\left(x^3 + 5x^2 - 55x - 42\right) \div \left(x + 10\right)$$

$$\begin{array}{r} x^2 - 5x - 5 \\ x+10 \enclose{longdiv}{x^3 + 5x^2 - 55x - 42} \\ -(x^3 + 10x^2) \quad \downarrow \quad \downarrow \\ -5x^2 - 55x - 42 \\ -(-5x^2 - 50x) \\ -5x - 42 \\ -(-5x - 50) \\ \textcircled{8} \end{array}$$

Answer: $x^2 - 5x - 5 + \frac{8}{x+10}$

$$\left(k^4 - 4k^3 + 3k - 15\right) \div \left(k - 4\right)$$

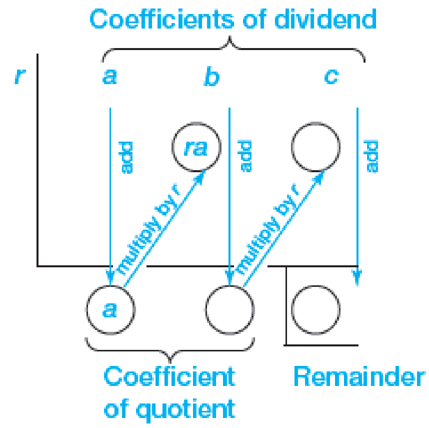
Nov 23-12:54 PM

pg.443 in your book.

Although dividing polynomials through long division is analogous to integer long division, it can still be inefficient and time consuming. Synthetic division is a shortcut method for dividing a polynomial by a linear factor of the form $(x - r)$. This method requires fewer calculations and less writing by representing the polynomial and the linear factor as a set of numeric values. After the values are processed, you can then use the numeric outputs to construct the quotient and the remainder.

pg.444 in your book.

To use synthetic division to divide a polynomial $ax^2 + bx + c$ by a linear factor $x - r$, follow this pattern.



You can use synthetic division in place of the standard long division algorithm to determine the quotient for $(2x^2 - 3x - 9) \div (x - 3)$.

Long Division	Synthetic Division

$2x + 3$
$x - 3\overline{)2x^2 - 3x - 9}$
$\underline{2x^2 - 6x}$
$3x - 9$
$\underline{3x - 9}$
0
	$r = 3$
	3 | 2 −3 −9
	     6 9 (multiply by r, add)
	    2 3 | 0

$(2x^2 - 3x - 9) \div (x - 3) = 2x + 3$	

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

3 | 2   −3   −9
     ↓   (3·2) 6   (3·3) 9
     2   3   [0]
Remainder

Answer
$2x+3$

$$\left(k^3 - 12k^2 + 21k + 6\right) \div \left(k - 2\right)$$

2	1	-12	21	6
	↓	2	-20	2
	1	-10	1	8

Remainder

Answer: $x^2 - 10x + 1 + \frac{8}{k-2}$

$$\left(r^4 - 2r^3 - 10r^2 - 3\right) \div \left(r + 1\right)$$

Answer:

$$r^3 - 3r^2 - 7r + 7 - \frac{10}{r+1}$$

-1	1	-2	-10	0	-3
	↓	-1	3	7	-7
	1	-3	-7	7	-10

$$\left(6x^5 - 2x^4 - 4x^3 - 10x + 19\right) \div \left(x - 1\right)$$

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$$9r^5 - 33r^4 + 12r^3 + 22r^2 - 19r + 31) \div (r - 3)$$

pg.445-6 in your book.

2. Two examples of synthetic division are provided. Perform the steps outlined for each problem:

   i. Write the dividend.

   ii. Write the divisor.

   iii. Write the quotient.

   iv. Write the dividend as the product of the divisor and the quotient plus the remainder.

a.

2	1	0	−4	−3	6
		2	4	0	−6
	1	2	0	−3	0

i.

ii.

iii.

iv.

3. Calculate each quotient using synthetic division. Then write the dividend as the product of the divisor and the quotient plus the remainder.

   a. $g(x) = x^3 + 1$

   $r(x) = x + 1$

   Calculate $\frac{g(x)}{r(x)}$.

not in your book.

1. The given table of values represents the function $f(x) = x^3 + 9x^2 + 14x - 24$.

x	-2	-1	0	1	2
$f(x)$	-24	-30	-24	0	48

a. Determine one of the factors of $f(x)$ without using a calculator. Explain your reasoning.

b. Completely factor $f(x)$ without using a calculator.

c. Determine all of the zeros of $f(x)$ without using a calculator.

2. Determine whether $2x - 4$ is a factor of $m(x) = 2x^4 - 8x^2 + 4$.

Nov 19-8:35 AM

not in your book.

3. The Polynomial Pool Company offers 10 different pool designs numbered 1 through 10. Each pool is in the shape of a rectangular prism. The volume of water in Pool Design x, can be determined using the function $V(x) = \ell(x) \cdot w(x) \cdot d(x) = 2x^3 + 18x^2 + 46x + 30$, where $\ell(x)$, $w(x)$, and $d(x)$ represent the length, width, and depth of the pool in feet.

   a. Determine the expressions for the functions $w(x)$ and $d(x)$ if $\ell(x) = 2x + 2$ and the width of each pool is greater than the depth. Do not use a calculator.

   b. Determine the length, width, and depth of Pool Design 9.

4. Determine whether $3x + 3$ is a factor of $p(x) = 3x^4 + 3x^3 - 6x^2 - 6x$.

Homework

Finish Lesson 6.2