5.7 #35

Interpret!

$$\frac{2x^3-9x^2+11x-6}{2x^2-3x+2} = x-3$$

$$\begin{array}{r l}
 & x - 3 \quad r\ 0 \\
2x^2-3x+2 & \overline{)\,2x^3-9x^2+11x-6} \\
- & (2x^3-3x^2+2x) \\
\hline
 & -6x^2+9x-6 \\
- & (-6x^2+9x-6) \\
\hline
 & 0
\end{array}$$

$$\frac{-6x^2}{2x^2} = -3$$

$$\frac{2x^3}{2x^2} = x$$

Interpret

$$2x^3-9x^2+11x-6 = (2x^2-3x+2)(x-3)$$

$$\frac{2x^3-9x^2+11x-6}{x-7} = 2x^2+5x+4+\frac{316}{x-7}$$

$$\begin{array}{r} 2x^2+5x+46 \quad r\ 316 \\ x-7 \,\big)\overline{\,2x^3-9x^2+11x-6\,} \\ -(2x^3-14x^2\quad) \\ \hline 5x^2+11x-6 \\ -(5x^2-35x\quad) \\ \hline 46x-6 \\ -(46x-322) \\ \hline 316 \end{array}$$

$$\begin{array}{r} {}^{4}46 \\ \times\ 7 \\ \hline 322 \end{array}$$

$$\begin{array}{r} 9\ r\ 2 \\ 3\,\big)\overline{29} \\ 27 \\ \hline 2 \end{array}$$

B. H.

$$\frac{\text{Dividend}}{\text{Divisor}} = \text{Quotient} + \frac{\text{Remainder}}{\text{Divisor}}$$

$$\frac{29}{3} = 9 + \frac{2}{3}$$

$$\text{Dividend} = (\text{Divisor})(\text{Quotient}) + \text{Remainder}$$

$$29 = (3)(9) + 2$$

$$\frac{2x^3 - 9x^2 + 11x - 6}{x - 7}$$

Synthetic Division.

$$\begin{array}{r|rrrr} 7 & 2 & -9 & 11 & -6 \\ & & 14 & 35 & 322 \\ \hline & 2 & 5 & 46 & 316 \\ & x^2 & x^1 & c & r \end{array}$$

$2x^2+5x+46 \quad r\ 316$

$2x^2+5x+46 \quad r\ 316$

This work shows that

$P(x)=2x^3-9x^2+11x-6 \underset{\uparrow\ 7}{=} (x-7)(2x^2+5x+46)+316$

what's $P(7)$?

$= 2(7)^3-9(7)^2+11(7)-6 = 316$

To find $P(7)$, divide by $x-7$ & grab ~~the remainder~~.

$11 = 101$

$\boxed{\text{No } x^4 \text{ term!}}$

$f(x)= 3x^5-4x^3+7x^2-11x-20$

Find $P(-3) = 469$

-977

$$\begin{array}{r|rrrrrr} & x^5 & x^4 & x^3 & x^2 & x^1 & c \\ -3 & 3 & 0 & -4 & 7 & -11 & -20 \\ & & -9 & 27 & -69 & 174 & -489 \\ \hline & 3 & -9 & 23 & -58 & 163 & -509 \end{array}$$

$$\begin{array}{r} 58 \\ \times\ 3 \\ \hline 174 \end{array} \qquad \begin{array}{r} 163 \\ \times\ 3 \\ \hline 489 \end{array}$$

Don't forget the 0 in the x^4 spot

§6.1 Rational Exponents

$$\sqrt[3]{.125} = \sqrt[3]{\frac{125}{1000}} = \frac{\sqrt[3]{125}}{\sqrt[3]{1000}}$$

$5 \,\overline{)125}$, $5 \,\overline{)25}$, 5

$2 \,\overline{)1000}$, $2 \,\overline{)500}$, $2 \,\overline{)250}$, $5 \,\overline{)125}$, $5 \,\overline{)25}$, 5

Product/Quotient of power/radical is radical/power of quotient.

$$\left(\frac{x^2}{y}\right)^5 = \frac{(x^2)^5}{y^5}$$

$$\frac{\sqrt[3]{5^3}}{\sqrt[3]{2^3 5^3}} = \frac{\sqrt[3]{5^3}}{\sqrt[3]{2^3}\sqrt[3]{5^3}} = \frac{5^{\frac{3}{3}}}{2^{\frac{3}{3}} 5^{\frac{3}{3}}} = \frac{5}{2 \cdot 5} = \frac{1}{2}$$

$$\frac{125}{1000} = \frac{5^3}{2^3 \cdot 5^3} = \frac{1}{2^3} = \frac{1}{8}$$

so $\sqrt[3]{\frac{1}{8}} = \frac{\sqrt[3]{1}}{\sqrt[3]{8}} = \frac{1}{2}$

$$\sqrt{x^2} = \boxed{|x| = \begin{cases} x & \text{if } x \geq 0 \\ -x & \text{if } x < 0 \end{cases}}$$

Let $x = -3 \Rightarrow \sqrt{x^2} = -x$

$x = +3 \Rightarrow \sqrt{x^2} = x$

$$\sqrt{x^2} = \sqrt{(-3)^2} = \sqrt{9} = 3 = -x$$

$\sqrt{}$ is the principal square root.

Never negative.

$|-5| = 5$

$|5| = 5$

In §6.1, they assume the variables aren't negative & try to shine you on this very important FACT:

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

In 6.1, you can get away with $\sqrt{x^2} = x$, but BEWARE.

$$x^2 = 1$$

$$\sqrt{x^2} = \sqrt{1}$$

$$|x| = 1$$

$$x = \pm 1$$

$$49^{\frac{1}{2}} = \sqrt{49}$$

$$(7^2)^{\frac{1}{2}} = \sqrt{7^2} =$$

$$7^{2(\frac{1}{2})} = 7^1 = 7$$

$$4^{\frac{5}{2}} = 4^{\left(\frac{1}{2}\right)(5)} = \left(4^{\frac{1}{2}}\right)^5 = 2^5 = 32$$

$$9^{\frac{3}{2}} = \begin{cases} \left(9^3\right)^{\frac{1}{2}} \\ \left(9^{\frac{1}{2}}\right)^3 \end{cases}$$

$$a^{bc} = \left(a^b\right)^c$$

$$9 = 3^2$$

$$\left(9^{\frac{1}{2}}\right)^3 = \left(\left(3^2\right)^{\frac{1}{2}}\right)^3$$

$$= \left(3^{(2)\left(\frac{1}{2}\right)}\right)^3$$

$$= 3^3 = 27$$

$$\left(x^{\frac{3}{4}}\right)^{\frac{4}{3}} = x^{\left(\frac{3}{4}\right)\left(\frac{4}{3}\right)} = x$$

$$\frac{x^{\frac{5}{6}}}{x^{\frac{2}{3}}} = x^{\frac{5}{6} - \frac{2}{3}\cdot\frac{2}{2}} = x^{\frac{1}{6}} = \sqrt[6]{x}$$

$\sqrt{-144}$ ain't real

$$= \sqrt{(-1)(144)} = \sqrt{-1}\,\sqrt{144}$$

$$= i \cdot 12$$

$$= 12i$$

$$\sqrt[3]{-1} = -1$$