

$$x-3 \overline{) \begin{array}{r} x^2 - 4x - 10 \\ x^3 - 7x^2 + 2x + 5 \end{array}} \quad r - 25$$

This says

$$P(x) = x^3 - 7x^2 + 2x + 5 = (x-3)(x^2 - 4x - 10) - 25$$

$$\rightarrow P(3) = -25$$

To find $P(3)$, we divided $P(x)$ by $x-3$ & grabbed the remainder.

Remainder Theorem: $P(c)$ is the remainder when $P(x)$ is divided by $x-c$.

Synthetic Division is for division by $x-c$. It does NOT work for x^2-c OR x^2+bx+c or any thing else. Just $x-c$.

$$x-3 \overline{) \begin{array}{r} x^3 - 7x^2 + 2x + 5 \\ x^2 - 4x - 10 \end{array}} \quad r - 25$$

Synthetic

$$\begin{array}{r|rrrr} 3 & 1 & -7 & 2 & 5 \\ & & 3 & -12 & -30 \\ \hline & 1 & -4 & -10 & -25 \\ & x^2 & x & c & r \end{array}$$

THIS WORK SAYS

$$x^3 - 7x^2 + 2x + 5 = (x-3)(x^2 - 4x - 10) - 25$$

Use Synthetic Division to find $P(2)$

$$\begin{array}{r|rrrr} 2 & 1 & -7 & 2 & 5 \\ & & 2 & -10 & -16 \\ \hline & 1 & -5 & -8 & -11 = P(2) \end{array}$$

$$\begin{aligned} P(2) &= 2^3 - 7(2)^2 + 2(2) + 5 \\ &= 8 - 28 + 4 + 5 \\ &= 17 - 28 = -11 = P(2) \end{aligned}$$



Divide $2x^5 - 4x^4 + 2x^3 - 5x + 7$
by $x-3$, synthetically.

$$\begin{array}{r|rrrrrr} 3 & 2 & -4 & 2 & 0 & -5 & 7 \\ & & 6 & 6 & 24 & 72 & 201 \\ \hline & 2 & 2 & 8 & 24 & 67 & 208 \end{array}$$

§6.4 Due Wed.

§6.5 Equations with Rational Expressions

$$\frac{A}{B} = \frac{C}{B} \implies A = C$$

$$\frac{3x}{x+5} = \frac{7}{x+5} \implies 3x = 7$$

$$x = \frac{7}{3}$$

$$\frac{2x}{x-2} = \frac{5}{x+3}$$

$$\text{LCD: } (x-2)(x+3)$$

METHOD 1

$$\frac{2x}{x-2} \cdot \frac{x+3}{x+3} = \frac{5}{x+3} \cdot \frac{x-2}{x-2}$$

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

$$2x(x+3) = 5(x-2)$$

$$2x^2 + 6x = 5x - 10$$

$$2x^2 + x + 10 = 0$$

etc.

METHOD 2
Clear Fractions

$$\frac{2x}{x-2} \cdot \frac{(x+3)\cancel{(x-2)}}{1} = \frac{5}{x+3} \cdot \frac{\cancel{(x+3)}(x-2)}{1}$$

$$2x(x+3) = 5(x-2)$$

Same deal.

Good work.
Poor Example.
(We can't solve this, yet.)

$$\frac{1}{2x} - \frac{1}{x+1} = \frac{1}{3x^2+3x}$$

$3x(x+1)$

$$\text{LCD} = 2x \cdot 3 \cdot (x+1)$$

$$\frac{1}{2x} \cdot \frac{2 \cdot 3 \cdot x(x+1)}{1} - \frac{1}{x+1} \cdot \frac{2 \cdot 3 \cdot x(x+1)}{1} = \frac{1}{3x(x+1)} \cdot \frac{2 \cdot 3 \cdot x(x+1)}{1}$$

$$\frac{1}{\cancel{2x}} \cdot \frac{\cancel{2} \cdot \cancel{3} \cdot \cancel{x}(x+1)}{1} - \frac{1}{\cancel{x+1}} \cdot \frac{\cancel{2} \cdot \cancel{3} \cdot \cancel{x}(x+1)}{1} = \frac{1}{\cancel{3x(x+1)}} \cdot \frac{\cancel{2} \cdot \cancel{3} \cdot \cancel{x}(x+1)}{1}$$

$$3(x+1) - 6x = 2$$

$$3x + 3 - 6x = 2$$

$$-3x + 3 = 2$$

$$-3x = -1$$

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

§ 6.5 Due Friday

§ 6.5 #s 1, 4, 5, 6, 9, 12, 15,
19, 22, 30