Homework Qs

Note Title 10/19/2015

4.3 #69) $xy\left(x+\frac{1}{y}\right)$

$xy(x) + \cancel{xy}\left(\frac{1}{y}\right)$

$= x^2y + \frac{x\cancel{y}}{\cancel{y}}$

$= \boxed{x^2y + x}$

OR

Ex: $xy\left(x + \frac{1}{x} - \frac{1}{y^2}\right)$

$xy(x) + xy\left(\frac{1}{x}\right) + xy\left(-\frac{1}{y^2}\right)$

$= x^2y + \frac{\cancel{x}y}{\cancel{x}} - \frac{xy}{y^2}$

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

$= \boxed{x^2y + y - \frac{x}{y}}$

4.4 #31) $\left(\frac{5}{9}x^3 + \frac{1}{3}x^2 - 2x + 1\right) - \left(\frac{2}{3}x^3 + x^2 + \frac{1}{2}x - \frac{3}{4}\right)$

$= \frac{5}{9}x^3 + \frac{1}{3}x^2 - 2x + 1 - \frac{2}{3}x^3 - x^2 - \frac{1}{2}x + \frac{3}{4}$

$= \frac{5}{9}x^3 - \frac{2}{3}x^3 + \frac{1}{3}x^2 - x^2 - 2x - \frac{1}{2}x + 1 + \frac{3}{4}$

$= \frac{5}{9}x^3 - \frac{2}{3}x^3 + \frac{1}{3}x^2 - \frac{3}{3}x^2 - \frac{4}{2}x - \frac{1}{2}x + \frac{4}{4} + \frac{3}{4}$

$= \frac{5}{9}x^3 - \frac{6}{9}x^3 +$

$= \boxed{-\frac{1}{9}x^3 - \frac{2}{3}x^2 - \frac{5}{2}x + \frac{7}{4}}$

4.4 #35) Subtract $10x^2 + 23x - 50$ from $11x^2 - 10x + 13$

$11x^2 - 10x + 13 - (10x^2 + 23x - 50)$

$= 11x^2 - 10x + 13 - 10x^2 - 23x + 50$ combine like terms

4.6: Special Products (Continued)

Ex: Using FOIL (First, Outer, Inner, Last)

$$(2x-3)(4x+9)$$
$$= 8x^2 + 18x - 12x - 27$$
$$= \boxed{8x^2 + 6x - 27}$$

Ex: $$(2x-5)(2x+5)$$
$$= 4x^2 + 10x - 10x - 25$$
$$= \boxed{4x^2 - 25}$$

Difference of 2 squares pattern:
$$(a+b)(a-b) = a^2 - b^2$$

Ex: $$(x-9)^2$$
$$= (x-9)(x-9)$$
$$= x^2 - 9x - 9x + 81$$
$$= \boxed{x^2 - 18x + 81}$$

Perfect Squares:
$$(a+b)^2 = a^2 + 2ab + b^2$$
$$(a-b)^2 = a^2 - 2ab + b^2$$

Ex: $$(x+6)^2$$
$$= \boxed{x^2 + 12x + 36}$$

Ex: $(2x-3)^3$

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

$= (4x^2 - 6x - 6x + 9)(2x-3)$

$= (4x^2 - 12x + 9)(2x-3)$

$= (2x-3)(4x^2 - 12x + 9)$

$= 2x(4x^2 - 12x + 9) - 3(4x^2 - 12x + 9)$

$= 8x^3 - 24x^2 + 18x$
$\quad\quad -12x^2 + 36x - 27$

$= \boxed{8x^3 - 36x^2 + 54x - 27}$

4.7: Dividing a polynomial by a monomial

Ex: $\frac{2}{7} + \frac{6}{7} - \frac{4}{7} + \frac{10}{7}$

$= \frac{2+6-4+10}{7} = \frac{14}{7} = \boxed{2}$

Ex: $\frac{6x^5 - 12x^3 + 10x^2 - 2}{3x^2}$

$= \frac{\cancel{6}^{2}x^5}{\cancel{3}_{1}x^2} - \frac{\cancel{12}^{4}x^3}{\cancel{3}_{1}x^2} + \frac{10\cancel{x^2}^{1}}{3\cancel{x^2}_{1}} - \frac{2}{3x^2}$

$= \frac{2x^3}{1} - \frac{4x}{1} + \frac{10}{3} - \frac{2}{3x^2}$

$= \boxed{2x^3 - 4x + \frac{10}{3} - \frac{2}{3x^2}}$

Ex:

$$\frac{2x^4y^3 + 8x^3y^3 - 3y^2}{2xy^2}$$

$$= \frac{2x^4y^3}{2xy^2} + \frac{8x^3y^3}{2xy^2} - \frac{3y^2}{2xy^2}$$

$$= \frac{x^3y}{1} + \frac{4x^2y}{1} - \frac{3}{2x}$$

$$= \boxed{x^3y + 4x^2y - \frac{3}{2x}}$$

4.8: Polynomial Long Division

(Dividing a Polynomial by a Polynomial)

Review of Terminology:

$$\begin{array}{r|l} & \text{Quotient} \\ \hline \text{Divisor} & \text{Dividend} \\ & \\ & \text{Remainder} \end{array}$$

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

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

Ex: Divide $\frac{379}{12}$.

$$
\begin{array}{r}
31 \\
12\overline{)379} \\
-36 \\
\hline
19 \\
-12 \\
\hline
7
\end{array}
$$

$\frac{379}{12} = \boxed{31 + \frac{7}{12}}$ usually written $31\frac{7}{12}$

Check: $(31)(12) + 7$

$= 372 + 7 = 379$ ✓

$$
\begin{array}{r}
31 \\
\times 12 \\
\hline
6^{2} \\
31 \\
\hline
372
\end{array}
$$

Ex: Divide $\dfrac{3x^2+7x+9}{x+2}$.

Note: We could write:

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

But none of the fractions reduce.

If the denominator has 2 or more terms, use polynomial long division.

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

$$
\begin{array}{r l}
 & 3x + 1 \\
x+2 \,\big) & 3x^2 + 7x + 9 \\
 & -(3x^2 + 6x) \\
\hline
 & 0 + x + 9 \\
 & -(x + 2) \\
\hline
 & 0 + 7
\end{array}
$$

$3x(x+2) = 3x^2+6x$

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

$$\frac{3x^2+7x+9}{x+2} = \boxed{3x+1+\frac{7}{x+2}}$$

Note: For $x = 10$, this becomes the numerical example $\frac{379}{12}$ we did earlier

Check: $(x+2)(3x+1)+7$

$= 3x^2 + x + 6x + 2 + 7$

$= 3x^2 + 7x + 9$ ✓ ok