Addition: Combine like terms

Subtraction: Keep,change,change

Multiplication: box method

division: - reduce (factor, cancel common factors) or - synthetic division

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Algebra II

Operations with Functions

For the following pairs of functions, find $f(x)+g(x)$, $f(x)-g(x)$, $f(x)\bullet g(x)$, and $\frac{f(x)}{g(x)}$

1. $f(x)=2x-8$, $g(x)=4x-16$

$f(x)+g(x)$

$(2x-8)+(4x-16)$

$2x-8$
$+\ 4x-16$
$6x-24$

$f(x)-g(x)$

$(2x-8)-(4x-16)$

$2x-8$
$+\ -4x+16$
$-2x+8$

$f(x)\cdot g(x)$

$(2x-8)(4x-16)$

	$2x$	-8
$4x$	$8x^2$	$-32x$
-16	$-32x$	$+128$

$8x^2-64x+128$

$\frac{f(x)}{g(x)}=\frac{2x-8}{4x-16}$

$\frac{2(\cancel{x-4})}{4(\cancel{x-4})}=\frac{2}{4}=\frac{1}{2}$

2. $f(x)=2x-8$, $g(x)=3x-12$

$f(x)+g(x)$

$(2x-8)+(3x-12)$

$2x-8$
$+3x-12$
$5x-20$

$f(x)-g(x)$

$(2x-8)-(3x-12)$

$2x-8$
$+\ -3x+12$
$-x+4$

$f(x)\cdot g(x)$

$(2x-8)(3x-12)$

	$2x$	-8
$3x$	$6x^2$	$-24x$
-12	$-24x$	$+96$

$6x^2-48x+96$

$\frac{f(x)}{g(x)}=\frac{2x-8}{3x-12}=\frac{2(\cancel{x-4})}{3(\cancel{x-4})}=\frac{2}{3}$

3. $f(x)=x^2-9$, $g(x)=4x+12$

$f(x)+g(x)$

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

x^2-9
$+\ 4x+12$
x^2+4x+3

$f(x)-g(x)$

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

$x^2\ \ -9$
$+\ \ -4x-12$
$x^2-4x-21$

$f(x)\cdot g(x)$

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

	x^2	-9
$4x$	$4x^3$	$-36x$
$+12$	$+12x^2$	-108

$4x^3+12x^2-36x-108$

$\frac{f(x)}{g(x)}=\frac{x^2-9}{4x+12}\ \frac{(\cancel{x+3})(x-3)}{4(\cancel{x+3})}=\frac{x-3}{4}$

4. $f(x)=x^2-5x-17$, $g(x)=x+2$

$f(x)+g(x)$

$(x^2-5x-17)+(x+2)$

$x^2-5x-17$
$+\ \ x+2$
$x^2-4x-15$

$f(x)-g(x)$

$(x^2-5x-17)-(x+2)$

$x^2-5x-17$
$+\ \ -x-2$
$x^2-6x-19$

$f(x)\cdot g(x)$

$(x^2-5x-17)(x+2)$

	x^2	$-5x$	-17
x	x^3	$-5x^2$	$-17x$
$+2$	$+2x^2$	$-10x$	-34

$x^3-3x^2-27x-34$

$\frac{f(x)}{g(x)}=\frac{x^2-5x-17}{x+2}$

$$\begin{array}{r|rrr} -2 & 1 & -5 & -17 \\ & & -2 & 14 \\ \hline & 1 & -7 & -3 \end{array}$$

$x-7-\frac{3}{x+2}$

*you can use mc strategy for this example

5. If $g(c) = 1 - c^2$ and $m(c) = c + 1$, then which statement is *not* true?

1) $g(c) \cdot m(c) = 1 + c - c^2 - c^3$ 3) $m(c) - g(c) = c + c^2$

2) $g(c) + m(c) = 2 + c - c^2$ ~~4)~~ $\frac{m(c)}{g(c)} = \frac{-1}{1-c}$ $\frac{c+1}{1-c^2}$ $\frac{\cancel{c+1}}{(\cancel{1+c})(1-c)} = \frac{1}{1-c}$

6. If $f(x) = x^2 + 9$ and $g(x) = x + 3$, which operation would not result in a polynomial expression?

1) $f(x) + g(x)$ $x^2+9+x+3 = x^2+x+12$ ✓

2) $f(x) - g(x)$ $x^2+9-x-3 = x^2-x+6$ ✓

3) $f(x) \bullet g(x)$

	x^2	$+9$
x	x^3	$9x$
$+3$	$3x^2$	27

$x^3+3x^2+9x+27$ ✓

~~4)~~ $f(x) \div g(x)$ $\frac{x^2+9}{x+3}$

-3	1	0	9
		-3	9
	1	-3	18

$x-3+\frac{18}{x+3}$ X

Not a polynomial expression. It's a rational expression.

7. Given: $f(x) = 2x^2 + x - 3$ and $g(x) = x - 1$

Express $f(x) \bullet g(x) - [f(x) + g(x)]$ as a polynomial in standard form.

$(2x^2+x-3)(x-1) - [(2x^2+x-3)+(x-1)]$

$(2x^3-x^2-4x+3) - (2x^2+2x-4)$

$2x^3-x^2-4x+3$

$+ \quad -2x^2-2x+4$

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

	$2x^2$	$+x$	-3
x	$2x^3$	$+x^2$	$-3x$
-1	$-2x^2$	$-x$	$+3$

$2x^3-x^2-4x+3$

8. The profit function, $p(x)$, for a company is the cost function, $c(x)$, subtracted from the revenue function, $r(x)$. The profit function for the Acme Corporation is $p(x) = -0.5x^2 + 250x - 300$ and the revenue function is $r(x) = -0.3x^2 + 150x$. The cost function for the Acme Corporation is

Profit = Revenue − Cost

amount made − amount spent

~~1)~~ $c(x) = 0.2x^2 - 100x + 300$ 3) $c(x) = -0.2x^2 + 100x - 300$

2) $c(x) = 0.2x^2 + 100x + 300$ 4) $c(x) = -0.8x^2 + 400x - 300$

$p(x) = r(x) - c(x)$
$+c(x) \quad\quad +c(x)$

$c(x) + p(x) = r(x)$
$-p(x) \quad -p(x)$

$c(x) = r(x) - p(x)$

$c(x) = (-0.3x^2+150x) - (-0.5x^2+250x-300)$

$c(x) = -0.3x^2+150x$
$+ \quad 0.5x^2-250x+300$
$.2x^2-100x+300$

9. A manufacturing company has developed a cost model, $C(x) = 0.15x^3 + 0.01x^2 + 2x + 120$, where x is the number of items sold, in thousands. The sales price can be modeled by $S(x) = 30 - 0.01x$. Therefore, revenue is modeled by $R(x) = x \bullet S(x)$. The company's profit, $P(x) = R(x) - C(x)$, could be modeled by

1) $0.15x^3 + 0.02x^2 - 28x + 120$ 3) $-0.15x^3 + 0.01x^2 - 2.01x - 120$

2) $-0.15x^3 - 0.02x^2 + 28x - 120$ 4) $-0.15x^3 + 32x + 120$

I'd use C strategy for this point

$P(x) = R(x) - C(x)$

$P(x) = x \cdot S(x) - C(x)$

$P(x) = x(30 - .01x) - (.15x^3 + .01x^2 + 2x + 120)$

$P(x) = 30x - .01x^2$

$+ \; -.15x^3 - 2x \; - .01x^2 - 120$

$-.15x^3 + 28x - .02x^2 - 120$

$-.15x^3 - .02x^2 + 28x - 120$