Topic: Combinations of functions

Question: Find $(f \cdot g)(x)$.

$$f(x) = 2x^2 + 5$$

$$g(x) = x + 2$$

Answer choices:

A $2x^3 + 5x^2 + 4x + 10$

B $2x^3 + 3x^2 + 3x + 10$

C $2x^3 + 4x^2 + 5x + 10$

D $2x^3 + 10x^2 + 10x + 10$

Solution: C

The combination $(f \cdot g)(x)$ is the same as the product $f(x) \cdot g(x)$. Therefore,

$$(f \cdot g)(x) = \left(2x^2 + 5\right)(x + 2)$$

We can find this product using the FOIL method.

$$(f \cdot g)(x) = 2x^3 + 4x^2 + 5x + 10\text{v}$$

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Question: Find $(f-g)(x)$.

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

$$g(x) = 3x^2 - 5x - 2$$

Answer choices:

A $\quad -x^2 + 11x - 1$

B $\quad x^2 + x - 5$

C $\quad -x^2 + 11x - 5$

D $\quad -x^2 + x - 1$

Solution: A

The combination $(f-g)(x)$ is the same as the difference $f(x)-g(x)$. Therefore,

$$(f-g)(x)=(2x^2+6x-3)-(3x^2-5x-2)$$

$$(f-g)(x)=2x^2+6x-3-3x^2-(-5x)-(-2)$$

$$(f-g)(x)=2x^2+6x-3-3x^2+5x+2$$

$$(f-g)(x)=-x^2+11x-1$$

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Question: The domain of $(f/g)(x)$ is all real numbers, except what?

$$f(x) = x^2 - 9$$

$$g(x) = 2x - 6$$

Answer choices:

A $\quad 6$

B $\quad 3$

C $\quad 0$

D $\quad -3$

Solution: B

The function

$$\left(\frac{f}{g}\right)(x)$$

is the same as the quotient

$$\frac{f(x)}{g(x)}$$

The domain of

$$\frac{x^2-9}{2x-6}$$

is all real numbers except those that make the denominator 0.

$$2x-6=0 \quad \rightarrow \quad 2x=6 \quad \rightarrow \quad x=3$$

So the only real number that isn't in the domain is 3.