Exercise 1.1.37

Instruction

For the pair of functions $f(x) = x - 8$ and $g(x) = 5x^2$, find each of the below new functions. Also determine the domain for each of these new functions.

(a) $f + g$

(b) $f - g$

(c) $f \cdot g$

(d) f/g

Solution

(a) Add the two given functions to form the requested function,

$$f + g = x - 8 + 5x^2 = 5x^2 + x - 8.$$

The domain of the above new function is all real numbers.

(b) Subtract the two given functions to form the requested function,

$$f - g = x - 8 - 5x^2 = -5x^2 + x - 8.$$

The domain of the above new function is all real numbers.

(c) Multiply the two given functions to form the requested function,

$$f \cdot g = (x - 8)5x^2 = 5x^3 - 8x^2.$$

The domain of the above new function is all real numbers.

(d) Divide the two given functions to form the requested function,

$$\frac{f}{g} = \frac{x - 8}{5x^2}.$$

The division is defined except for for $x = 0$, the domain is hence $x \neq 0$.

Answer

(a) $5x^2 + x - 8$, domain: all real numbers.

(b) $-5x^2 + x - 8$, domain: all real numbers.

(c) $5x^3 - 8x^2$, domain: all real numbers.

(d) $\frac{x-8}{5x^2}$, domain: $x \neq 0$.