

### Exercise 1.1.37

#### Instruction

For the pair of functions  $f(x) = x - 8$  and  $g(x) = 5x^2$ , find the below new listed 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:  $x \neq 0$ .