9.3 Combining Two Functions: Products

A Definitions

The product of two functions is defined by

$$(fg)(x) = f(x)g(x)$$
$$(f \times g)(x) = f(x) \times g(x)$$

Ex 1. Let $f(x) = x^2$ and $g(x) = \log x$. Find

a) $(fg)(1)$

b) $(f \times g)(0)$

B Domain of the Product of Two Functions

The domain of the product of two functions is the intersection of their domains.

$$D_{fg} = D_{f \times g} = D_f \cap D_g$$

Ex 2. For each case, find the domain of the product of the given functions.

a) $f(x) = 2^x$; $g(x) = \sin x$

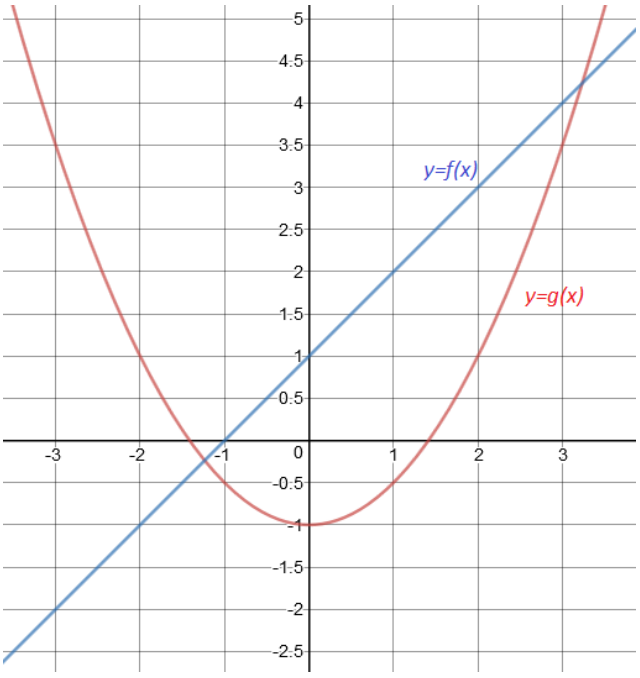
b) $f(x) = \dfrac{1}{x-2}$; $g(x) = \log x$

c) $f(x) = \sqrt{3-x}$; $g(x) = \log(x+1)$

C Point by Point

Evaluate fg at every possible number x.

Ex 3. The functions f and g are given by their graphs on the right figure. Graph the function fg.



Ex 4. Prove that the product of two odd functions is an even function.

Ex 5. Complete the following table. Justify your reasoning.

	fg	even	odd
g	even		
	odd		

Ex 6. For each case, justify your answer.

a) Is the product of two polynomial functions a polynomial function?

b) Is the product of two rational functions a rational function?

c) Is the product of two sine functions a sine function?

d) Is the product of two periodic functions a periodic function?

Ex 7. For each case, graph on the same grid the functions f and g, and then the graph of the product fg. Use technology (Desmos) to check your answer.

a) $f(x) = x \quad ; \quad g(x) = \sin x$

b) $f(x) = \cos x \quad ; \quad g(x) = \sqrt{x}$

c) $f(x) = x^3 \quad ; \quad g(x) = 0.5^x$

d) $f(x) = \log x \quad ; \quad g(x) = 10^x$

Ex 8. Find the zeroes of the product fg where

$f(x) = \sqrt{x^2 - 4x} \quad ; \quad g(x) = \log(2 - x)$

Ex 9. If D_f and D_g are the domains of the functions f and g and if Z_f and Z_g are the sets of zeroes of the functions f and g, make a statement about the zeroes of the product fg.

Reading: Nelson Textbook, Pages 531-537
Homework: Nelson Textbook, Page 537 #3, 5, 8, 12, 17

