### 9.4 Exploring Quotients of Functions

#### A Definitions

The quotient of two functions is defined by

\[
(f / g)(x) = \frac{f(x)}{g(x)}
\]

\[
(f + g)(x) = f(x) + g(x)
\]

\[
\left(\frac{f}{g}\right)(x) = \frac{f(x)}{g(x)}
\]

**Ex 1.** Let \( f(x) = 1 + x^2 \) and \( g(x) = \sqrt{x-1} \). Find

a) \( (f / g)(1) \)

b) \( (f + g)(2) \)

c) \( \left(\frac{g}{f}\right)(1) \)

#### B Domain of the Quotient of Two Functions

The domain of the quotient of two functions is given by

\[
D_{f/g} = \{x \in \mathbb{R} | x \in D_f \cap D_g \text{ and } g(x) \neq 0\}
\]

Note. Division by zero is not allowed.

**Ex 2.** For each case, find the domain of the quotients \( f / g \) and \( g / f \).

a) \( f(x) = 2^x \); \( g(x) = \log x \)

b) \( f(x) = x^2 - 4 \); \( g(x) = \sqrt{x-1} \)

**Ex 3.** The functions \( f \) and \( g \) are given by their graphs. Graph the function \( f / g \).
Ex 4. The functions \( f \) and \( g \) are given graphically on the right figure. Match each graph given below with one of the following combinations:

a) \( f + g \)
b) \( f - g \)
c) \( g - f \)
d) \( fg \)
e) \( f / g \)
f) \( g / f \)

Reading: Nelson Textbook, Pages 540-542
Homework: Nelson Textbook, Page 542 #1,2