***Function Operations***

Let andbe any two functions. You can add, subtract, multiply or divide andto form a new function.

The domain of new function consist of the -values that are in the domains of both and **.** When new function

involves division, the domain does not include -values for which the denominator is equal to zero.

|  |  |
| --- | --- |
| ***Operation*** | ***Definition*** |
| ***Addition*** |  |
| ***Subtraction*** |  |
| ***Multiplication*** |  |
| ***Division*** |  |

**Sample Problem 1: Find for each and . Determine the domain of each new function.**

|  |  |  |  |
| --- | --- | --- | --- |
| **a.** |  | **b.** |  |
|  | **)** |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  | If the function can be simplified, determine the domain before simplifying! |

**Composition of Functions**

The composition of function with function is defined by

The domain of the composite function is the set of all such that:

1. is in the domain of and

2. is in the domain of .

**Sample Problem 2: Find each composite function. Determine the domain of each composite function.**

|  |  |  |  |
| --- | --- | --- | --- |
| **a.** |  | **b.** |  |
|  |  |  |  |
| **c.** |  | **d.** |  |
|  |  |  |  |

**Sample Problem 3: Find and then evaluate each composite function.**

|  |  |  |  |
| --- | --- | --- | --- |
| **a.** |  | **b.** |  |
|  |  |  |  |

**Decomposition of Composite Functions**

When you form a composite function, you “compose” two functions to form a new function. It is also possible to reverse this process. You can “decompose” a given function and express it as a composition of two functions. Although there is more than one way to do this, there is often a “natural” selection that comes to mind first.

**Sample Problem 4:**  **Express as a composition of two functions and**

|  |  |  |  |
| --- | --- | --- | --- |
| **a.** |  | **b.** |  |
|  |  |  |  |