FUNCTIONS, CONTINUED: TABULAR REPRESENTATIONS

V. Representations of Functions in Tables

A function can be represented by a table that lists the values of the independent variable along with the corresponding values of the function (that is, the corresponding values of the dependent variable). A function that has a *finite* domain can be represented completely using a table, though if the domain is large, this may not be convenient. Any function can be *partially* represented by such a table, but of course, if there are infinitely many numbers in the domain, it is not possible to list *all* of the values of the independent variable and the corresponding values of the function.

Example:

Let f be the function that assigns to each of the counting numbers n from 1 to 10 the *sum* of the first n counting numbers. For example, $f(5) = 1 + 2 + 3 + 4 + 5 = 15$. The table of values of this function is as follows:

n	1	2	3	4	5	6	7	8	9	10
$f(n)$	1	3	6	10	15	21	28	36	45	55

The table indicates that $f(1) = 1, f(2) = 3, \ldots, f(10) = 55$.

The domain of the function f is the set {1, 2, 3, 4, 5, 6, 7, 8, 9, 10}.
The range of f is the set {1, 3, 6, 10, 15, 21, 28, 36, 45, 55}.

Note that the *rule* would work for any counting number, but the *function f* is only defined for the counting numbers from 1 to 10. Unless stated otherwise, the domain of a function represented by a table is exactly the set of values of the independent variable that are listed in the table.

Exercises:

1. Let g be the function that assigns to each of the counting numbers n from 1 to 12 the sum of the first n **even** counting numbers. For example, $g(4) = 2 + 4 + 6 + 8 = 20$.

   Fill in the missing entries in the table of values of this function:

n	1	2	3	4	5	6	7	8	9	10	11	12
$g(n)$	2	6	12	20								

   What is the domain of this function?
   What is the range of this function?

FUNCTIONS: TABULAR REPRESENTATIONS, CONTINUED

2. Let $f(x)$ be the function represented by the following table:

x	1	2	3	5	6	7	8	9	10
$f(x)$	3	6	9	15	18	21	24	27	30

   a. What is the domain of this function?

   b. What is the value of $f(6)$?

   c. What is the value of $f(4)$?

3. Let $g(x)$ be the function represented by the following table:

x	1	2	3	4	5	6	8	9	10
$g(x)$	9	3.2	1/2	143	17	2.9	47	$\sqrt{2}$	0

   a. What is the domain of this function?

   b. What is the value of $f(2)$?

   c. What is the value of $f(7)$?

4. Determine whether each of the following tables represents a function.
   If the table represents a function, give the domain and range; if not, explain why not.

   a.

x	2	4	5	6	8	9	10	15	23	94
$f(x)$	7	3	2	9	12	3	18	36	45	55

   b.

x	5	7	3	9	2	6	7	12	15	10
$g(x)$	9	8	7	6	12	11	10	15	27	55

   c.

x	0.1	0.2	0.3	0.4	0.5	0.7	0.8	0.9
$h(x)$	0	2	5	9	14	20	27	35

   d.

x	1	3	5	7	9	11	13	15	17	19	21
$r(x)$	5	2	5	2	5	2	5	2	5	2	7

5. Can a function have more numbers in its **domain** than it has in its **range**?
   If so, give an example, and if not, explain why not.

6. Can a function have more numbers in its **range** than it has in its **domain**?
   If so, give an example, and if not, explain why not.