

Beginning Activities for Section 6.1

Mathematical Reasoning: Writing and Proof, Version 3

Beginning Activity 1 (Functions from Previous Courses)

Equations (1), (3), (4), (6), and (7) can be used to define a function with x as the input and y as the output. In Equation (7), the domain must be restricted to all real numbers not equal to 1.

Beginning Activity 2 (Some Other Types of Functions)

1.
 - (a) The birthday function b is a function since each person has exactly one birthday.
 - (b) We can write the fact that Andrew Wiles' birthday is April 11 as $b(\text{Andrew Wiles}) = \text{April 11}$.
 - (c) The statement is true since there has been at least one person born on each day of the year.
 - (d) The statement is false since there do exist different people who have the same birthday.

 2.

(a)	$s(1) = 1$	$s(5) = 6$	$s(9) = 13$	$s(13) = 14$
	$s(2) = 3$	$s(6) = 12$	$s(10) = 18$	$s(14) = 24$
	$s(3) = 4$	$s(7) = 8$	$s(11) = 12$	$s(15) = 24$
	$s(4) = 7$	$s(8) = 15$	$s(12) = 28$	$s(16) = 31$

 - (b) There does not exist a natural number n such that $s(n) = 5$. This can be seen by the values of $s(1)$, $s(2)$, $s(3)$, and $s(4)$ in Part (2) and by observing that if $n \geq 5$, then 1 and n are factors of n , and so $s(n) > 5$.
 - (c) Yes. For example, $s(6) = s(11) = 12$ and $s(14) = s(15) = 24$.
 - (d) Part (b) shows that Statement (i) is false, and Part (c) shows that Statement (ii) is false.
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