

TWO THEOREMS

1. CST vs XST FUNCTIONS

Theorem 1.1.

In CST, if A is a set with two elements, then there cannot exist a function, Q, from A ONTO F, the set all functions from A to A.

Proof: Proof is well known.

Theorem 1.2.

In XST, if A is a set with two elements, then there exists a function, Q, from A ONTO F, the set of all binary functions from A to A. (with $|A| = |Q|$)

Proof: Proof follows by example.

Example 1.1. Given $A = \{ < a >, < b > \}$ with

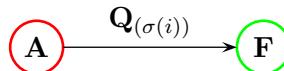
$$\begin{aligned} F = \{ & < \{ < a, a >, < b, a > \} >, \\ & < \{ < a, a >, < b, b > \} >, \\ & < \{ < a, b >, < b, a > \} >, \\ & < \{ < a, b >, < b, b > \} \} >. \end{aligned}$$

$$F = \{ < w >, < x >, < y >, < z > \}, \text{ (elements renamed)}$$

Assume set Q exists such that:

1) $|A| = |Q|$

2) $1 \leq i \leq 16$



$Q_{(\sigma(1))}(\{ < a > \}) = \{ < w > \}$	$Q_{(\sigma(1))}(\{ < b > \}) = \{ < w > \}$	$\sigma(1) = << 1 >, < 2 >>$
$Q_{(\sigma(2))}(\{ < a > \}) = \{ < w > \}$	$Q_{(\sigma(2))}(\{ < b > \}) = \{ < x > \}$	$\sigma(2) = << 1 >, < 3 >>$
$Q_{(\sigma(3))}(\{ < a > \}) = \{ < w > \}$	$Q_{(\sigma(3))}(\{ < b > \}) = \{ < y > \}$	$\sigma(3) = << 1 >, < 4 >>$
$Q_{(\sigma(4))}(\{ < a > \}) = \{ < w > \}$	$Q_{(\sigma(4))}(\{ < b > \}) = \{ < z > \}$	$\sigma(4) = << 1 >, < 5 >>$
$Q_{(\sigma(5))}(\{ < a > \}) = \{ < x > \}$	$Q_{(\sigma(5))}(\{ < b > \}) = \{ < w > \}$	$\sigma(5) = << 1 >, < 6 >>$
$Q_{(\sigma(6))}(\{ < a > \}) = \{ < x > \}$	$Q_{(\sigma(6))}(\{ < b > \}) = \{ < x > \}$	$\sigma(6) = << 1 >, < 7 >>$
$Q_{(\sigma(7))}(\{ < a > \}) = \{ < x > \}$	$Q_{(\sigma(7))}(\{ < b > \}) = \{ < y > \}$	$\sigma(7) = << 1 >, < 8 >>$
$Q_{(\sigma(8))}(\{ < a > \}) = \{ < x > \}$	$Q_{(\sigma(8))}(\{ < b > \}) = \{ < z > \}$	$\sigma(8) = << 1 >, < 9 >>$
$Q_{(\sigma(9))}(\{ < a > \}) = \{ < y > \}$	$Q_{(\sigma(9))}(\{ < b > \}) = \{ < w > \}$	$\sigma(9) = << 1 >, < 10 >>$
$Q_{(\sigma(10))}(\{ < a > \}) = \{ < y > \}$	$Q_{(\sigma(10))}(\{ < b > \}) = \{ < x > \}$	$\sigma(10) = << 1 >, < 11 >>$
$Q_{(\sigma(11))}(\{ < a > \}) = \{ < y > \}$	$Q_{(\sigma(11))}(\{ < b > \}) = \{ < y > \}$	$\sigma(11) = << 1 >, < 12 >>$
$Q_{(\sigma(12))}(\{ < a > \}) = \{ < y > \}$	$Q_{(\sigma(12))}(\{ < b > \}) = \{ < z > \}$	$\sigma(12) = << 1 >, < 13 >>$
$Q_{(\sigma(13))}(\{ < a > \}) = \{ < z > \}$	$Q_{(\sigma(13))}(\{ < b > \}) = \{ < w > \}$	$\sigma(13) = << 1 >, < 14 >>$
$Q_{(\sigma(14))}(\{ < a > \}) = \{ < z > \}$	$Q_{(\sigma(14))}(\{ < b > \}) = \{ < x > \}$	$\sigma(14) = << 1 >, < 15 >>$
$Q_{(\sigma(15))}(\{ < a > \}) = \{ < z > \}$	$Q_{(\sigma(15))}(\{ < b > \}) = \{ < y > \}$	$\sigma(15) = << 1 >, < 16 >>$
$Q_{(\sigma(16))}(\{ < a > \}) = \{ < z > \}$	$Q_{(\sigma(16))}(\{ < b > \}) = \{ < z > \}$	$\sigma(16) = << 1 >, < 17 >>$

Q exists.