



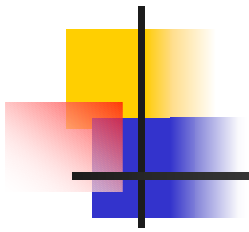
Function – Multiple Representation

- Section 1.2
 - Function comes from the Latin *functus* meaning “to perform”.
 - Leonhard Euler provided the modern notation for function, $f(x)$, where f represents the rule, x the independent variable, and $f(x)$ the dependent variable



Model: Falling Body

- A basketball is dropped over a motion sensor, providing data in hundredths of a second on the distance the ball falls in feet. What is the relationship between time and distance for the falling basketball?



Seconds	Feet		Seconds	Feet
0	4.5085		0.22	3.6443
0.02	4.4941		0.24	3.4894
0.04	4.4689		0.26	3.3274
0.06	4.4257		0.28	3.1545
0.08	4.3717		0.3	2.9637
0.1	4.3033		0.32	2.762
0.12	4.2276		0.34	2.5496
0.14	4.1376		0.36	2.3227
0.16	4.026		0.38	2.085
0.18	3.918		0.4	1.8365
0.2	3.7919		0.42	1.5773



Falling Body Analysis

- What are the variables in the Falling Body problem?
 - Solution: Time and Distance
- Is there a relation between the two variables?
 - Yes, any 2 variables can form a relation
- What is the association in this relation?
 - Confounding, since they have no direct effect on each other, but are changing in a related manner



Univalence Property

- Each element in the domain of a relation is assigned to a single element in the range of the relation.
- Univalence means one-valued.
 - Does the Falling Body data satisfy the univalence property?
 - Solution: Yes, each time is paired with only one distance above the ground.



Function

- A relation which satisfies the univalence property is called a function.
- Independent variable – replacement set or domain
- Dependent variable – solution set or range

- Discuss with your partner your definition of function. What does function mean to you?



Domain and Range

- What is the domain and range for the falling body function?
 - Solution: Domain – time from 0 to 4.2 seconds
 - Range – distance from 1.5773 to 4.5085 feet



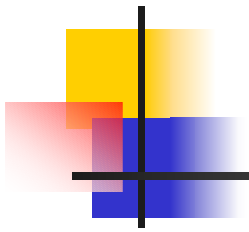
Multiple Representations

- Functions can be represented
 - Numerically as tables
 - Geometrically as graphs or scatterplots
 - Algebraically as equations
- It is important to be able to identify functions in any of these representations.



Numeric or Table Form

- How do we determine if a table represents a function?
 - Examine the tables in Assessment 2. Which are functions? Why?
- Method: Examine ordered pairs to ensure that each independent variable is paired with only one dependent variable

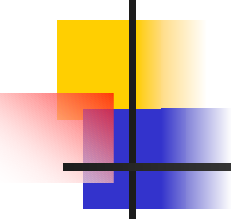
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- Does the Falling Body table represent a function?
 - Solution: Yes, each time is paired with only one distance.

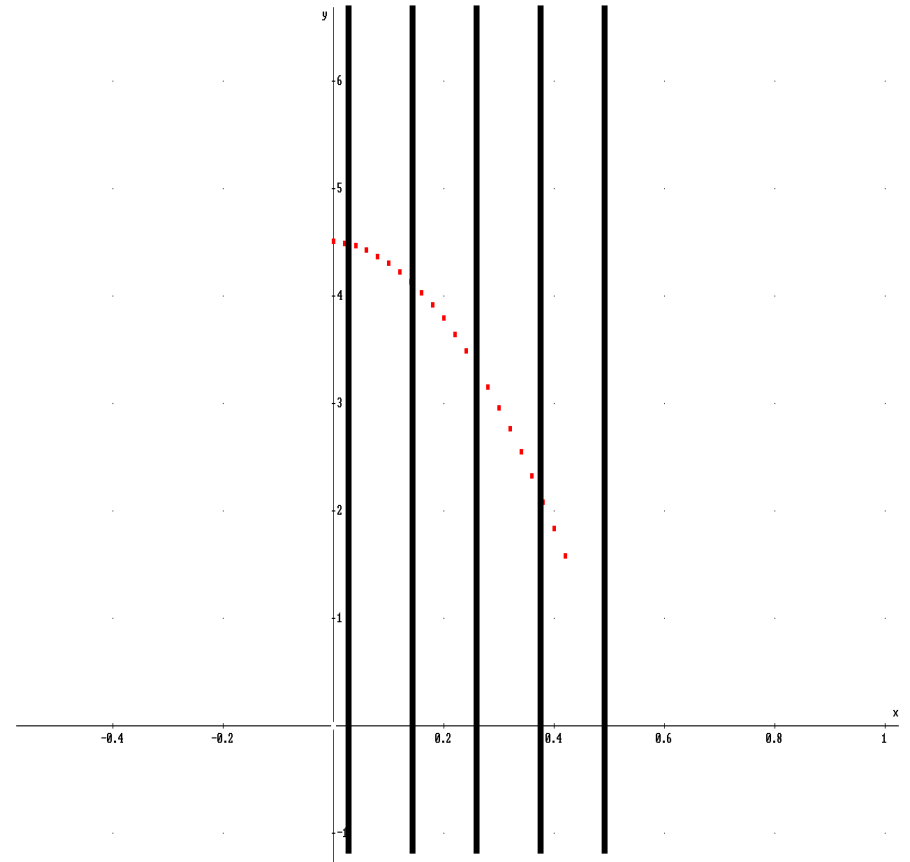
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Geometric or Graph Form

- How do we determine if a graph represents a function?
 - Examine the graphs in Assessment 2. Which are functions? Why?
- Method: Vertical Line Test

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- Does the Falling Body scatterplot represent a function?
 - Solution: Yes, any vertical line will intersect only one point.





Algebra or Equation Form

- How do we determine if an equation represents a function?
 - Examine the equations in Assessment 2. Which are functions? Why?
- Method: an equation is a function if whenever $x_1 = x_2$ then $f(x_1) = f(x_2)$

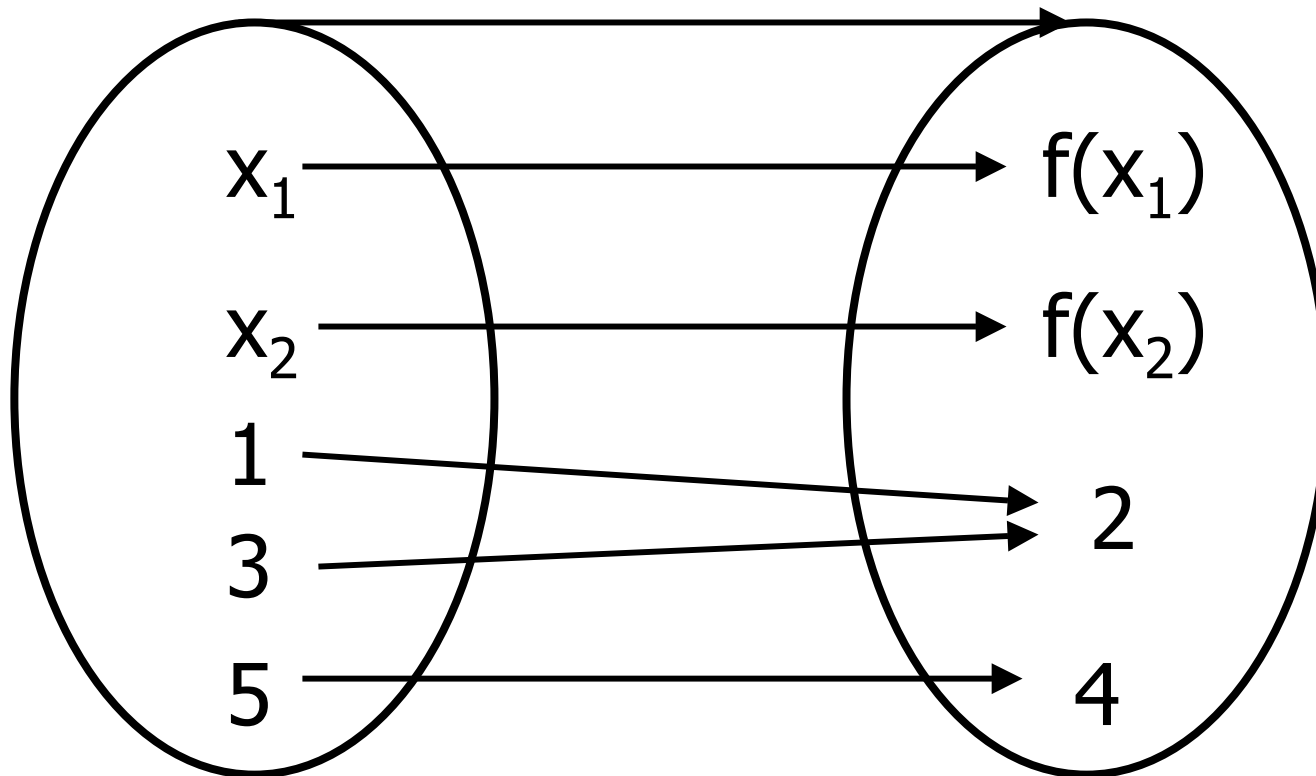
Function Diagram

Is this a function?

Domain f

f

Range f

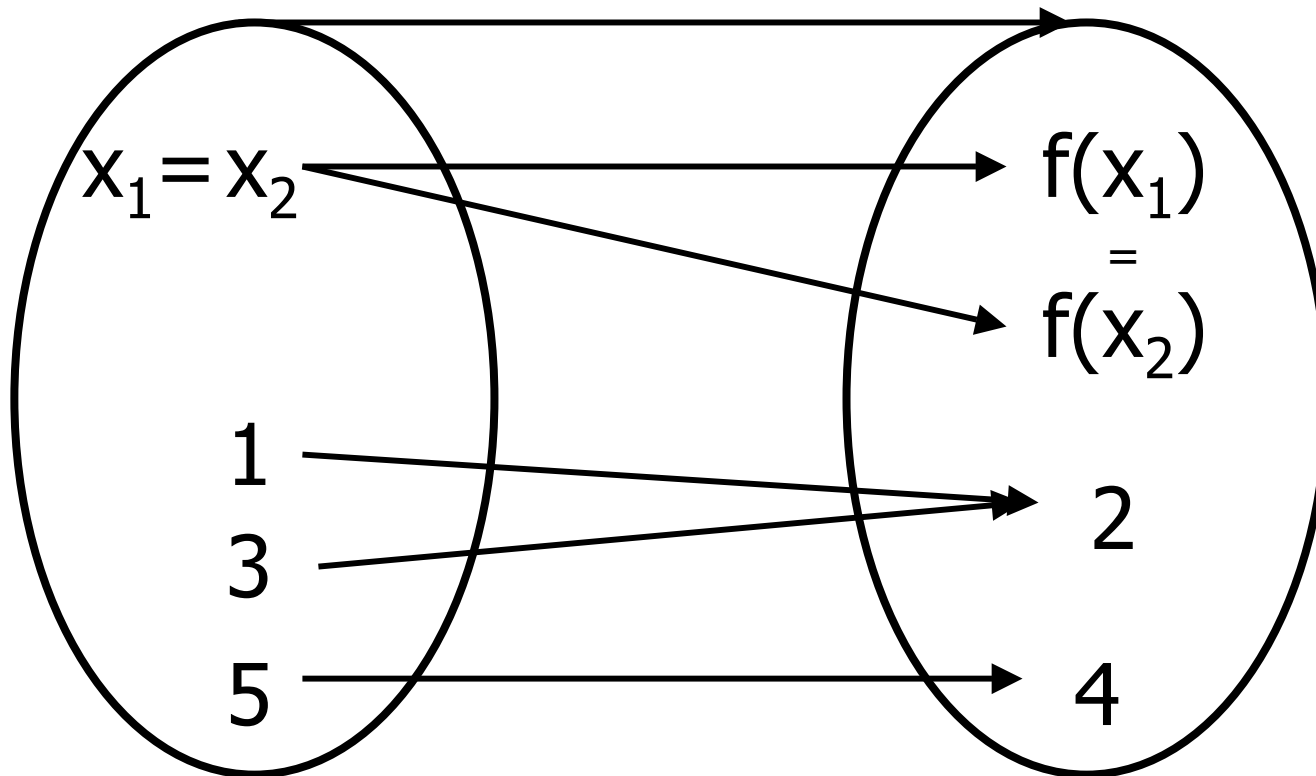


What must be true about $f(x_1)$ and $f(x_2)$ if this is a function?

Domain f

f

Range f





Algebraic Form

- How do we determine if an equation represents a function?
 - Apply the definition of function:
an equation is a function if whenever
 $x_1 = x_2$ then $f(x_1) = f(x_2)$
 - Solve for y and determine if there is more than one answer