Artifact 16 – Identifying Functions

Driving Question: What makes a relation a function, and how do you check it in a set of ordered pairs, a table, a mapping, or a graph?

Example 1

A snack machine has six buttons. The table shows the price, in dollars, of the item behind each button.

(x) inputs → Outputs → (y)

Button	1	2	3	4	5	6
Price	1.25	1.50	1.25	2.00	1.50	1.75

Write the relation as ordered pairs, (button, price). (1, 1.25), (2, 1.50), (3, 1.25), (4, 2.00), (5, 1.50), (6, 1.75)

Is the price a function of the button? Explain. Yes – each input (x) has only one output (y)

Two buttons cost 1.25 and two cost 1.50. Does that break anything? Explain. No – Still a function. Two inputs can happen to have the same output, just not the other way around.

Read it backwards, (price, button). Is the button a function of the price? Explain.

No – these inputs have more than one output.

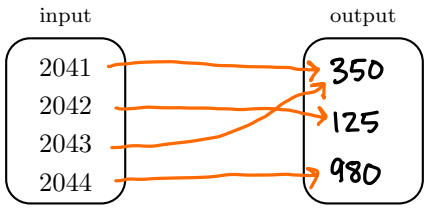
1.25 → 1, 3

1.50 → 2, 5

2.00 → 4

Example 2

Machine Card 5 from your board: a credit union's four accounts and their balances, (account number, balance in dollars). Draw it as a mapping.



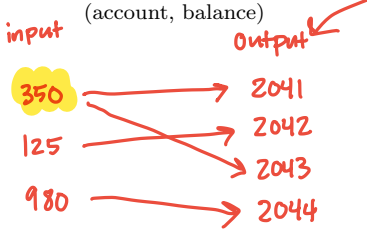
Is the balance a function of the account number? Explain.

Yes – each input just has one arrow leaving it; two arrows arriving at one output is fine.

In a mapping, what does "not a function" look like?

An input w/ 2 or more arrows leaving it

(account, balance)



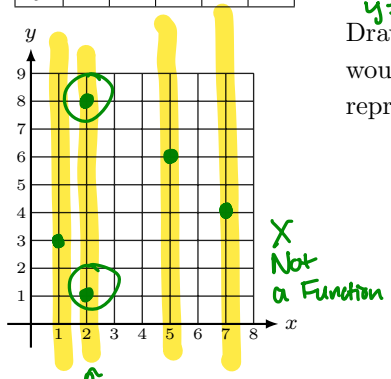
Now reverse it, (balance, account). Sketch that mapping on the left. Is the account a function of the balance? Explain. No – now, the input of 350 has 2 outputs: (350, 2041) (350, 2043)

we have repeating x-values

Example 3

The table shows a relation. Plot its points.

x	1	2	2	5	7
y	3	8	1	6	4



X Not a Function

Fails the Vertical Line Test → draw a vertical line everywhere – if one line intersects multiple times → fails

Is y a function of x? Where does the picture show it?

not a function

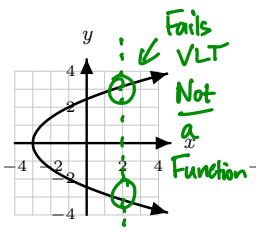
(2, 8) (2, 1)

No – repeating x-values

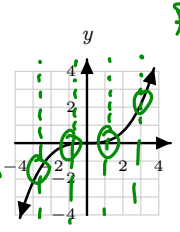
2 → 8, 2 → 1

When x=2, we have 2 y-values: y=8 & y=1 → can't have >1 output for same input.

Draw a vertical line through each graph where it would cross the most points. Which graph represents a function? Explain.



Fails VLT – Not a Function



Passes VLT ✓ Is a Function

Notes to Forgetful Self

Given	Where a repeated INPUT shows	A repeated OUTPUT means
ordered pairs	(1, 3), (2, 6), (3, 6), (2, 8) *can't have repeating x-values	(2, 9), (3, 8), (4, 8), (6, 10) *Repeating y-values okay
a table	x: 1 2 3 2 / y: 3 6 6 8 ← X	x: 2 3 4 6 / y: 9 8 8 10 ✓
a mapping	1 → 3, 2 → 6, 8, 3 — can't have >1 arrows branch from 1 input	2 → 9, 3 → 8, 4 → 8 *Two arrows arriving at same output okay
a graph	Fails Vertical Line Test (VLT)	6 → 10 ✓ Passes VLT (horizontal line okay)

A relation is a function when every input has exactly one output.

Does the order of the pairs matter? Does the direction, (x, y) or (y, x), matter?

No.

Yes. If we read examples 1 & 2 backwards, it's no longer a function.