

## Gus the Goose

Gus the Goose went out to play  
Out with friends one sunny day  
How many? You may wish to ask?  
The **set** of friends with whom Gus basked?  
He began to count them  $|(1, 2, 3)|$   
And found the **cardinality**!

The next day new friends came to play  
And some friends had to go away  
This gave a new set:  $\{2, 3, 4\}$   
Looks like Gus has friends galore!

The first day, we had called friends “ $A$ ”  
The next day Gus played with friends called “ $J$ ”  
What are these two sets put together?  
The **union** of these friends forever?  
We get set  $K$  with all of them!  
For Gus, the games have just begun.

What about the geese who stayed?  
The **intersection** of both days?  
We get  $\{2, 3\}$  as you can see,  
Its got “2” cardinality!  
Just be careful about amount  
The things in both may double count

Soon the geese began to play  
Dodgeball would make it a great day!  
Lets make teams, two sets,  $P, T$   
Each one a **subset** of the big group  $G$

After  $T$  won, they recorded the game  
The time balls were thrown, along with the name

This **relation** between them shows us the game  
Who hit who and who stayed the same  
A relation like this is also a set  
The **cartesian product** is the biggest one yet  
After the question, losing team had their doubts  
When in the game did each person get out?

They made a **relation** of each person and times  
To find when each person had gone behind.  
Each person could only have once been outed  
So there is only one pair (player, time) per player who pouted  
Because at the end, every player was outed  
This **function** took inputs and then outputted  
The time that each goose got knocked out  
So that they could see without a doubt  
That they had lost and the others had won  
But that's OK, they had lots of fun!

Gus was happy  
He had had a great day  
But Gus the goose was scarcely known  
To quickly find the way back home  
He took a left and then two rights  
And found himself in dead of night  
Without a path to get back home  
So sat down and began to groan

A stranger heard this passing by  
"Hello there goose, why do you cry?"  
Gus explained his situation  
And asked the person for direction  
The stranger said "fear not, don't fret"  
"The way back home is not lost yet"  
He began to draw a **graph** of roads

And paths between the many **nodes**

“Now in the graph there is a way

For you to get back home today“

Gus travelled quickly to and fro

And just as soon as you could know

He made it back to his own house

Very quickly, as if a mouse

Gus decided to be more wary

That night was simply much too scary

He took some **edges** from the graph

So each **pair** had a unique path

This **tree** Gus drew helped him sleep breezy

For now his travels would be easy