Gus the Goose

Gus the Goose went out to play

Out with friends on a sunny day

Who were they? You may try to ask?

This **set** of friends with whom Gus basked?

$\{\dots\}$

Duckie, Cottontail, and Blues McGee

He began to count them (1, 2, 3) and ended with the cardinality!

Tomorrow 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!

Yesterday, we called friends “A”

Today Gus plays with friends called “J”

What happens if we join them together?

The **union** of these friends forever?

We get set “K” with all of them!

{1, 2, 3, 4}

What if we took the friends from both?

The **intersection** of these days that goeth?

We get {2, 3} as you can see!

Its got “2” cardinality

Just be careful about the count for union,

The sum of both may be more than bargained!

Phew! Now that was quite a bit of work

Now lets go have a bit of mirth

Cottontail thought of a game to play

Dodgeball would make it an excellent day!

Lets make teams, two sets, P and T

Each one a **subset** of the big group G

Now how to think about who hit who?

Consider some pairs of goose to goose

{Pairs}

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 if each person had gone behind.

Each person could only have been once been outed

So there is only one pair (player, time) per player who pouts

Because at the end, every player was outed

This **function** took inputs and then outputted

The time that each goose got knocked out

And they could see without a doubt

That they had lost and Gus had won

But that’s OK, they had lots of fun!

Gus was happy

He had had a great day

He wanted to go home

but couldn’t find a way

He needed to get from house to house

But he wanted to travel, as quick as a mouse

He had a list of all the streets

A relation on all the places to eat!

This graph he drew as quickly as he could

Drawing a tangle of walkways called edges

How could he get from house A to house Z?

Which of the paths to travel should he?

Once he made it back home he had an idea

How could he connect all the houses together?

He didn’t want to have to become absentee

The new acyclic graph he called it a tree!

Gus was exhausted

He went off to sleep

He dreamt of soft sheep

Without making a peep

When he woke up, refreshed

He wondered “hmm see”

I know all these meanings,

But don’t have feelings

Because how can I reason about

Graphs, sets, and trees?

I can argue directly “A leads to B”

But it may not be easy if it cannot be

What if I went through another direction?

I start with the opposite and find a contradiction?

That means that the opposite cannot be true

So the statement is done. Yay and woo-hoo!