

Mathematics 1550H – Introduction to probability

TRENT UNIVERSITY, Winter 2018

Assignment #3

Scramble

Due on Friday, 2 February.

Consider the word “suspension”.

1. How many different ways are there to arrange all the letters in the word if copies of the same letter can be told apart? [2]
2. How many different ways are there to arrange all the letters in the word if copies of the same letter are indistinguishable? [4]
3. How many ways are there to arrange some, but not all, of the letters that appear in the word if at most one copy of each letter can be used? [4]

The Physicist’s Lament

or

It All Started With Wave-Particle Duality

Extremely tiny billiard balls
Create a force on every wall
Moving much too fast to fall
I’ve looked at light that way
But now this doesn’t seem to fit
When looking through a double slit
And shadows blur a little bit
With this peculiar ray

I’ve looked at light from both sides now
From speck and wave and still somehow
It’s light’s illusions I recall
I really don’t know light, at all

Moving steady as can be
With lots of simultaneity
A smooth increase in entropy
I’ve looked at time that way
But near the speed of light I’ve found
All rates of change start slowing down
While antimatter turns things round
And goes the other way

I’ve looked at time from both sides now
From where and when and still somehow
It’s just equations I recall
I really don’t know time at all

Yellow, red, and sometimes blue
Just u’s and d’s will nicely do
To give protons and neutrons too
I’ve looked at quarks that way
But lambdas now are acting strange
They’re taking much too long to change
For something’s lost if something’s gained,
During their strong decay

I’ve looked at quarks from both sides now,
From up and down, and still somehow
It’s only hadrons I recall,
I really don’t know quarks at all

William Hughes

(A pastiche of *Both Sides Now* by Joni Mitchell.)