EXPERIMENT Report

# EXPERIMENT

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| Report Date | Project Name | Prepared By |
| 27/10/2019 | Discrete Biostatistics | Tommy Meek, Justin Clifton |

# QUESTION: What do we want to figure out?

Let P\_n be a path on n vertices. We are considering a discrete-time stochastic process where each vertex begins off. Each vertex turns on at some time determined by an identical and independent geometric distribution. We are looking for P\_k where all k vertices are on. We are looking to find the probability distributions given different values of n and k.

# PROCESS: WHAT WILL WE DO TO ANSWER THE QUESTION?

We will do math. First, we will solve for n = 1. then n = 2, then proceed until we can deduce a generic formula in terms of n.

# RESULTS: WHAT HAPPENED IN THE PROCESS?

There is currently confusion about what n and k are. Also, the use of the word path in Dr. Penland’s notes is slightly confusing. We need to understand these terms before we can proceed. We may have to make assumptions and hope they are correct. After emailing Dr. Penland, we understood this more. Thus, we began trying to recreate the work that we had already done in the meetings. We started simple, working with n = 1, k = 1. During this process, we found that P\_1 = (1-lambda)^t-1 \* lambda. Next, we worked with n = 2, k = 1. Here is a table of our findings:

|  |  |
| --- | --- |
| t | P\_1(t) |

|  |  |
| --- | --- |
| 1 | y^2 + 2y(1-y) =(2y-y)^2 |
| 2 | (1-y)^2 (2y – y)^2 |
| 3 | (1-y)^4 \* (2y -y)^2 |
| 4 | (1-y)^6 (2y-y^2) |

This lead us to conclude that in general P\_1(t) = (1-y)^(2-1)(2y – y)^2. After, we began work on n = 2, k = 2.

|  |  |
| --- | --- |
| t | P\_2(t) |

|  |  |
| --- | --- |
| 1 | y^2 |
| 2 | (1-y)^2y^2 + (2y(1-y))^2 |
| 3 | (1-y)^4 y^2 + (2y (1-y))^2 \* (1-y)^2 |
| 4 | (1-y)^6 y^2 + 3(1-y)^4 (2y(1-y))^2 |

# Conclusions : WHAT DID WE LEARN?

The general form for n = 1, k = 1 is: P\_1(t) = (1-y)^(2-1)(2y – y)^2.

The general form for n=2, k = 2 is: P\_2(t) = (1-y)^(2(t-1)) y^2 + (t-1) (2y(1-y))^2 ((1-y)^2)^(t-2)

# CONJECTURES & FUTURE QUESTIONS: WHAT COMES NEXT?

Solve when k > 1.

# DOCUMENTATION: WHERE CAN WE SEE THE RESULTS?