

Semester Project: Simulating Pooled Testing

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1 Introduction

For this project, I wrote a program to simulate pool testing on a population, assuming that tests were 100% accuracy. The population was broken up into pools of 8 and with a disease infection rate of 2%.

2 Population = 1000

Observations: This simulation ran almost instantaneously.

```
Case(1): 125 x 0.85 --> 106 instances with 106 tests used
Case(2): 125 x 0.1496 --> 18 instances with 149 tests used
Case(3): 125 x 0.0004 --> 1 instances with 7 tests used
-----
262 tests found 20 infected people in a population of 1000 people
```

3 Population = 10000

Observations: This simulation ran almost instantaneously.

```
Case(1): 1250 x 0.85 --> 1169 instances with 1169 tests used
Case(2): 1250 x 0.1496 --> 193 instances with 1341 tests used
Case(3): 1250 x 0.0004 --> 13 instances with 81 tests used
-----
2591 tests found 200 infected people in a population of 10000 people
```

4 Population = 100000

Observations: This simulation took about 12 seconds to run.

```
Case(1): 12500 x 0.85 --> 10638 instances with 10638 tests used
Case(2): 12500 x 0.1496 --> 1731 instances with 14441 tests used
Case(3): 12500 x 0.0004 --> 131 instances with 815 tests used
-----
25894 tests found 2000 infected people in a population of 100000
```

5 Population = 1000000

Observations: Running the simulation with this population took almost 30 minutes. I probably could improve on this by aiming for lower asymptotic run times with some of my functions.

```
Case(1): 125000 x 0.85 --> 106346 instances with 106346 tests used
Case(2): 125000 x 0.1496 --> 17363 instances with 144662 tests used
Case(3): 125000 x 0.0004 --> 1291 instances with 7937 tests used
-----
258945 tests found 20000 infected people in a population of 1000000
```