Statistics and Probability in the Courtroom
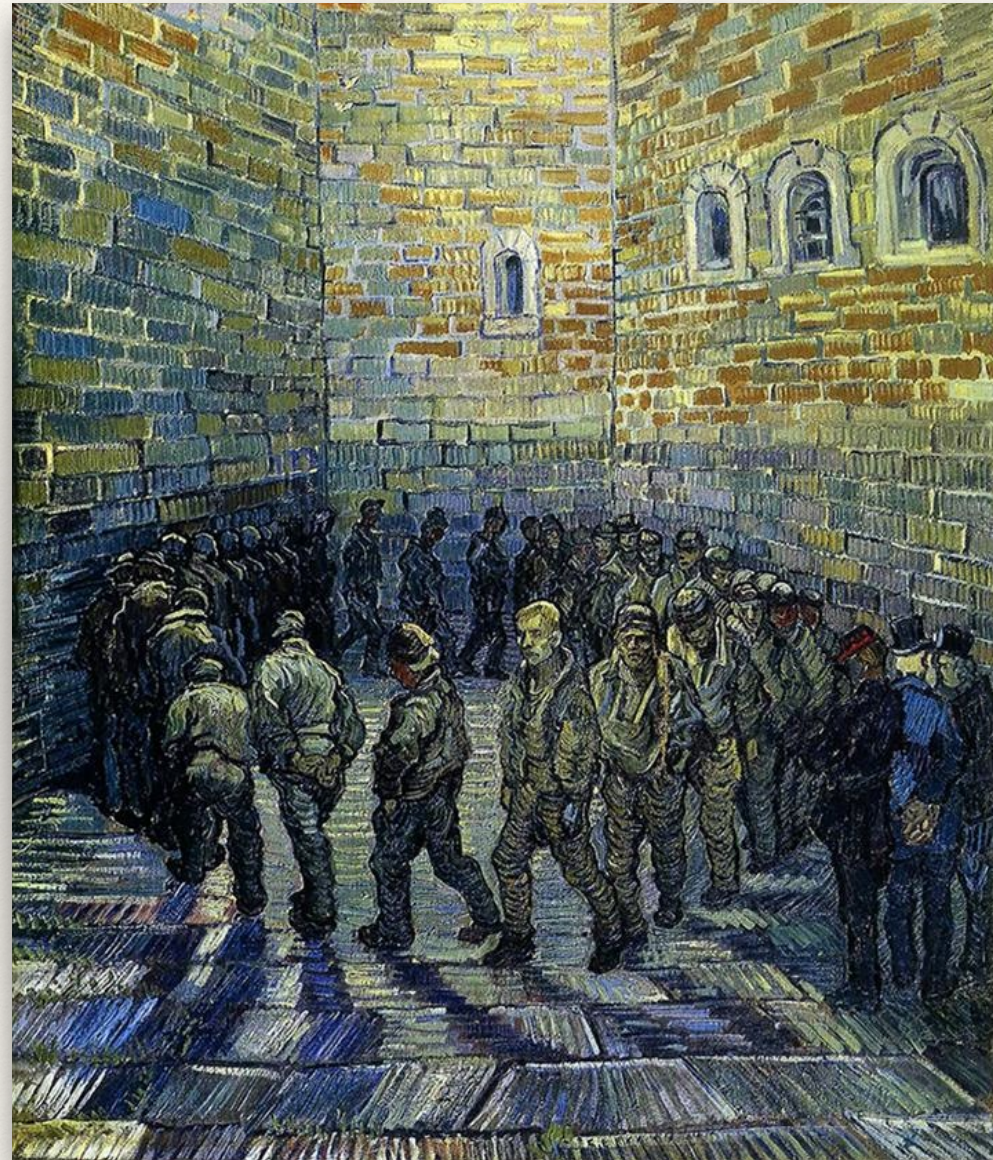
The Prison Yard Scenario

* 99 of 100 prisoners present kill the only guard on duty

* After the fact, one prisoner is picked at random and tried

* He is 99% likely to be one of the killers

* Is that enough to convict him?

- **999 of 1,000** prisoners present kill the guard

- One prisoner picked at random is **99.9% likely** to be a killer

- Is that enough to convict him?
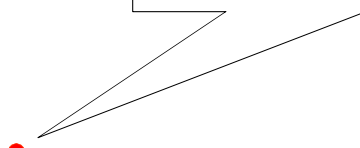
EXTREME Prison Yard Scenario

What about DNA Evidence?

* In a homicide case, traces of blood are found on the crime scene

* The traces conclusively establish that whoever left them is the perpetrator

* **The only open question is, WHO left the traces?**

    * One man's DNA profile **matches** with the traces found at the crime scene

    * The DNA profile has a **statistical frequency of 1 in 100 million**

* Is that enough to convict?

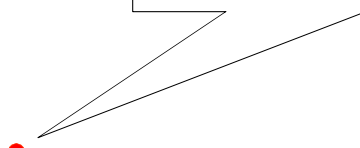# What did nurse Lucia B. do?

Number of deaths in a children hospital in Amsterdam (2000-2001)
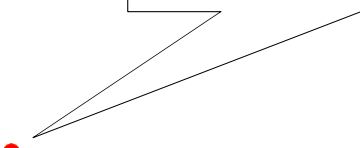
shifts	with no incident	with incident
with Lucia B.	134	8
without Lucia B.	887	0

Statistics and Probability at Sentencing

Charles Shonubi

- Shonubi was found carrying **427 grams of heroin** at JFK airport

- At sentencing, the prosecutor argued that Shonubi carried a **larger amount of heroin**:

  - Shonubi made **eight trips** between the US and Nigeria

  - He fits the **profile of a drug courier**

  - Statistical evidence suggested that he carried **1,930 grams of heroin in total**

- Trial judge sided with prosecutor
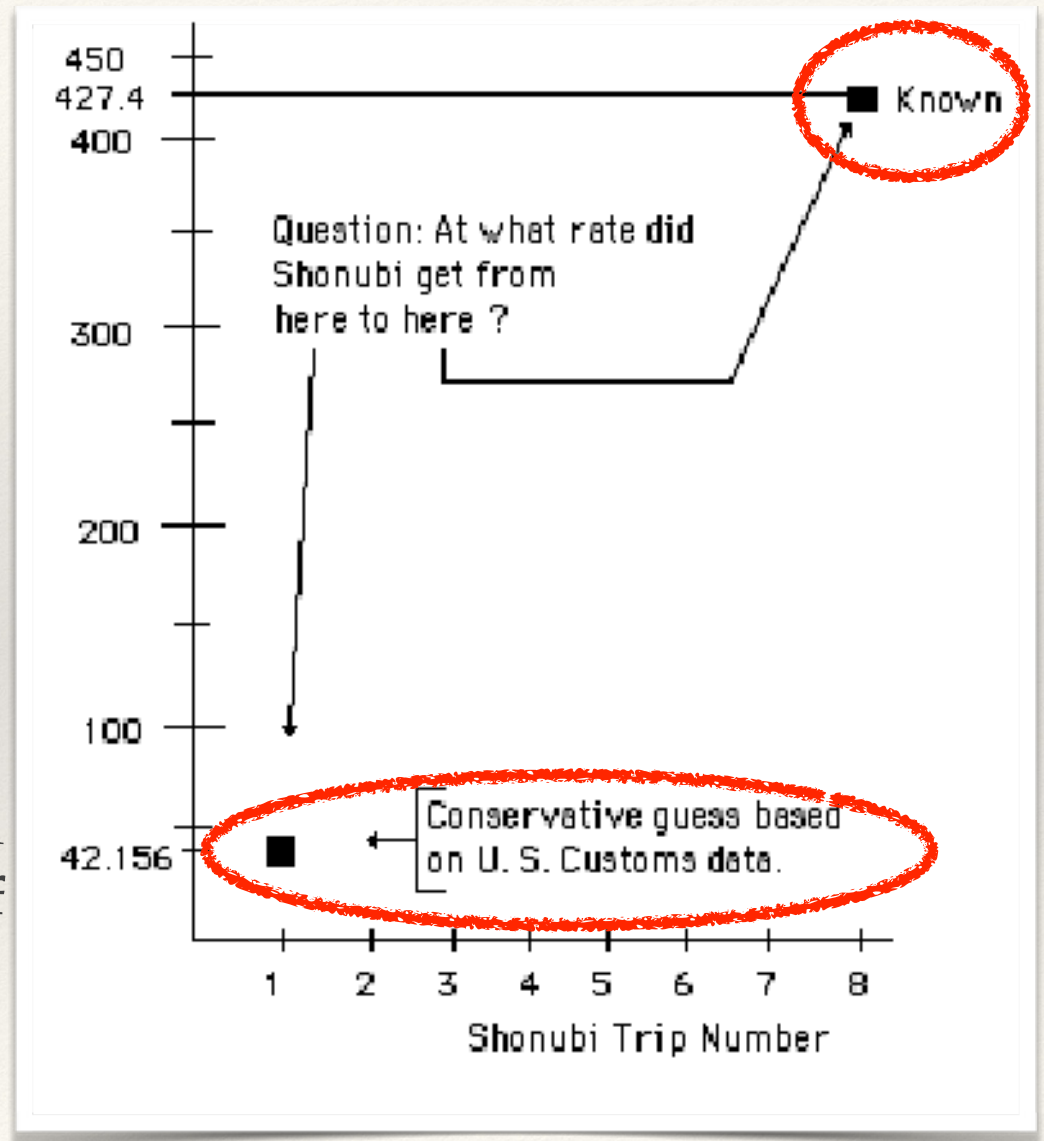
STATIC-99 – TALLY SHEET

Subject Name: _____

Place of Scoring: _____

Date of Scoring: _____ **Name of Assessor:** _____

Question Number	Risk Factor	Codes	Score
1	Young	Aged 25 or older Aged 18 – 24.99	0 1
2	Ever Lived With	Ever lived with lover for at least two years? Yes No	 0 1
3	Index non-sexual violence - Any Convictions?	No Yes	0 1
4	Prior non-sexual violence - Any Convictions?	No Yes	0 1
5	Prior Sex Offences	Charges Convictions None None 1-2 1 3-5 2-3 6 + 4+	 0 1 2 3
6	Prior sentencing dates (excluding index)	3 or less 4 or more	0 1
7	Any convictions for non-contact sex offences	No Yes	0 1
8	Any Unrelated Victims	No Yes	0 1
9	Any Stranger Victims	No Yes	0 1
10	Any Male Victims	No Yes	0 1
	Total Score	**Add up scores from individual risk factors**	

	POINTS	Risk Category
Suggested Nominal Risk Categories	0,1	Low
	2,3	Moderate-Low
	4,5	Moderate-High
	6+	High

Psychological Assessment for Sentencing or Parole

Statistics Outside the Trial

Policing in NYC
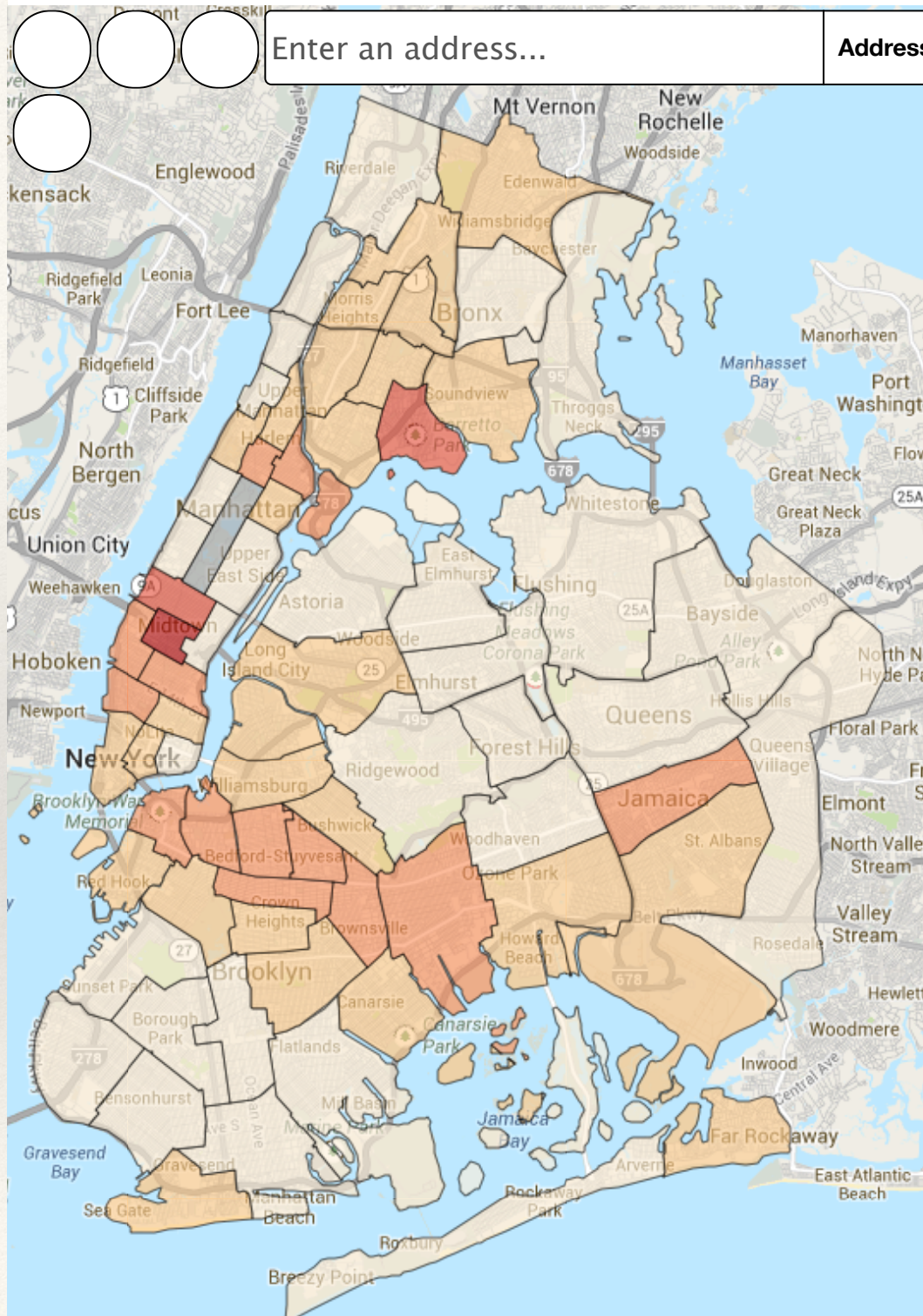
Enter an address...   Address ▾

Precinct Map

Graduated Point Map (zoom in)

Heat Map (zoom in)

All

Murder

Rape

Robbery

Monthly

Nov 2013 ⬍

Jan 1, 2013 - Nov 30, 2013

Jan 1, 2012 - Nov 30, 2012

Jan 1, 2012 - Dec 31, 2012

All crimes per 1,000 residents

☐ 0.3060 - 0.9809

☐ 0.9809 - 1.492

☐ 1.492 - 2.346

☐ 2.346 - 3.484

☐ 3.484 - 12.20

Amazon shipping system

```
┌─────────────────────────┐       ┌─────────────────────────┐
│  Gather historical      │       │  Select closest-proximity│
│  shipment tracking data │       │  order-satisfying one of │
│  from common carrier    │       │  speculatively shipped   │
│  for packages in transit│       │  packages  608           │
│  600                    │       │                          │
└───────────┬─────────────┘       └───────────┬─────────────┘
            │                                 │
            ▼                                 ▼
┌─────────────────────────┐       ┌─────────────────────────┐
│  Generate predictive    │       │  Convey delivery address │
│  shipping model         │       │  of order to location of │
│  dependent upon tracking│       │  selected closest-       │
│  data  602              │       │  proximity package  610  │
└───────────┬─────────────┘       └───────────┬─────────────┘
            │                                 │
            ▼                                 ▼
┌─────────────────────────┐       ┌─────────────────────────┐
│  Speculatively ship     │       │  Assign delivery address │
│  packages to            │       │  to selected closest-    │
│  corresponding          │       │  proximity package  612  │
│  destination geographical│       │                          │
│  areas without completely│       │                          │
│  specifying delivery    │       │                          │
│  address  604           │       │                          │
└───────────┬─────────────┘       └───────────┬─────────────┘
            │                                 │
            ▼                                 ▼
┌─────────────────────────┐       ┌─────────────────────────┐
│  Customer places order  │       │  Delivery selected       │
│  satisfiable by one of  │       │  closest-proximity       │
│  speculatively shipped  │       │  package  614            │
│  packages  606          │       │                          │
└─────────────────────────┘       └─────────────────────────┘
```