Mathematica Cubic Spline – A Better Way

\[
s_1(x) = a_1 x^3 + b_1 x^2 + c_1 x + d_1; \\
s_2(x) = a_2 x^3 + b_2 x^2 + c_2 x + d_2; \\
\text{NSolve}\{s_1(1) == 2 \&\& s_1(3) == 7 \&\& s_2(3) == 4 \&\& s'\prime(3) == s_1''(3) \&\& s''(3) == s_1''(3) \&\& s''(1) == 0 \&\& s''(7) == 0, \{a_1, b_1, c_1, d_1, a_2, b_2, c_2, d_2}\}
\]

Generating Random Numbers

“Anyone who considers arithmetical methods of producing random integer is, of course, in a state of sin”

- John von Neumann

Middle Square Method

To generate 4 digit pseudo-random integers start with a 4 digit number (seed), square it (8 digits), keep the middle 4 digits, repeat

Linear Congruence: Starting with a seed value \(x_0\) and recursively apply the formula \(x_{n+1} = (a \cdot x_n + b) \% c\) for some integers values \(a\), \(b\), and prime \(c\)

Detecting Repeated Elements in a List

```python
def isElementOf(x, a):
    for i in range(len(a)):
        if x == a[i]:
            return True
    return False
```

Simulating Probabilistic Behavior with Python

Rolling a Die
Flipping A Coin

For Friday - Chapter 5.4 – 5.5