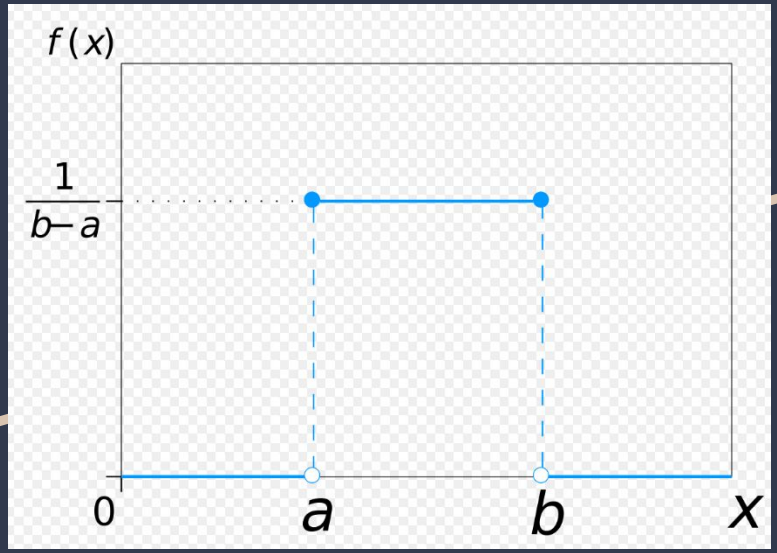
Random Numbers

Random Number Theory

- **Main point:** Nothing is ever random!!
  - Any “random number generator” is always making a *pseudo-random* number

Random Number Generation



- Goal = generate numbers using a *uniform* distribution
  - Every number between *a* and *b* has an equal chance of getting picked

Random Number Example: Die Roll

- All numbers between 1 and 6 have an equal chance of getting picked
    - This is a *uniform distribution*, with *a = 1* and *b = 6*

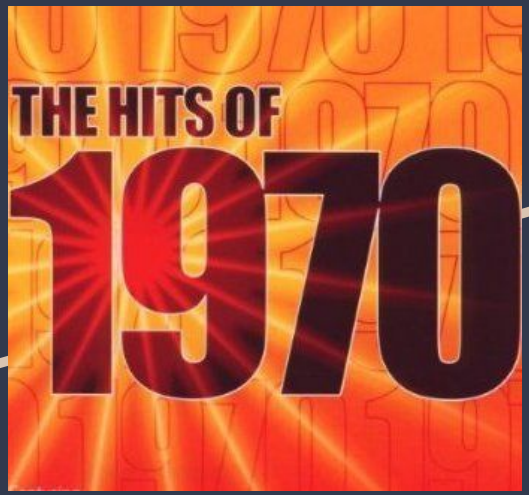
Random Numbers: Computer Science

- Non-quantum computers use *pseudo-random* generators to produce uniform distributions
  - Use math formulas, or even pre-calculated tables, to pick numbers that seem random

Random Numbers: C

- The most commonly used C random number generator is the **rand()** function
  - Found within the <stdlib.h> library

Random Numbers: C



- **rand()** function is used in conjunction with the **getpid()** function
  - Found within the <unistd.h> library
  - Calculates the number of seconds since Jan 1, 1970 (minus leap seconds)

Using Random Numbers in C

- Heading:

```
#include <stdio.h>
#include <unistd.h>
#include <stdlib.h>
```

- Within main()

```
/*First line:*/ srand(getpid());
/*Then, use rand() to generate numbers*/
        Ex: int num1 = rand();
```

Random Number / Modulus Challenge

- Create a 10-sided die generator
  - Make code that will output random numbers between the numbers of 1 & 10, to simulate a 10-sided die