COMP2511
Random Numbers in Java

Randomness

Randomness is also useful

- in computer games:
  - may want aliens to move in a random pattern
  - the layout of a dungeon may be randomly generated
  - may want to introduce unpredictability
- in physics/applied maths:
  - carry out simulations to determine behaviour
    - e.g. models of molecules are often assume to move randomly
- in testing:
  - *stress test* components by bombarding them with random data
  - random data is often seen as *unbiased data*
    - gives average performance (e.g. in sorting algorithms)
- in cryptography

Random Numbers

How can a computer pick a number at random?

- it cannot !

Software can only produce *pseudo random numbers*.

- a pseudo random number is one that is predictable
  - (although it may appear unpredictable)

⇒ Implementation may deviate from expected theoretical behaviour

Generating Random Numbers in Java

Using random class,

- Need to import the class `java.util.Random`
- *Option-1:* Creates a new random number generator.

```
Random rand = new Random();
```

- *Option-2:* Creates a new random number generator using a single long **seed**. Every time you run a program with the same seed, you get exactly the same sequence of 'random' numbers.

```
Random rand = new Random(long seed);
```

- To vary the output, we can give the random seeder a starting point that varies with time. For example, a starting point (seed) is the current time.

- Go to the API for more information at https://docs.oracle.com/en/java/javase/11/docs/api/java.base/java/util/Random.html