A2Q5

Suppose we toss a coin 10 times. Then we would expect to get 5 heads and 5 tails. But often we won't. Let's estimate the probability of getting 5 heads and 5 tails by doing a simple experiment.

Toss a coin 10 times and count the number of heads h that we get. Repeat this 10,000 times in a loop and record in a frequency array F how many times we get h heads, i.e., after the experiement F[h] is the number of times we got h heads for 0 <= h <= 10.

Write Maple code that runs the experiement, that is, creates the frequency array F.

```
> restart:
> bit := rand(0..1):
> bit();
```

$$0 \quad (1)$$

```
> bit();
```

$$0 \quad (2)$$

```
> F := Array(0..10);
```

$$F := [0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, \cdots 0 .. 10 \text{ Array}] \quad (3)$$

```
> for n from 1 to 10000 do
      L := [ seq( bit(), i=1..10) ];
      h := add(i,i=L);
      F[h] := F[h] + 1;
  od:
  F;
```

$$[5, 111, 414, 1155, 2067, 2530, 2021, 1179, 414, 95, 9, \cdots 0 .. 10 \text{ Array}] \quad (4)$$

Now estimate the probability of getting exactly 5 heads

```
> evalf(F[5]/add(i,i=F));
```

$$0.2530000000 \quad (5)$$

The probability of getting exactly 5 heads is about 24%