

Success runs

★
1110001111111000001011011
1011101011100111000000100
1001010010010110110001010
0010110001101000110100011

★★
1110010100101010001010111
0100010011101110001010100
0100010111010100010100100
0011101010001000101111010

Success runs

*
1110001111111000001011011
1011101011100111000000100
1001010010010110110001010
0010110001101000110100011

**
1110010100101010001010111
0100010011101110001010100
0100010111010100010100100
0011101010001000101111010

- ❖ What is the chance that one will see at least five consecutive heads (a “**success run of length 5**”) *somewhere* in a sequence of 50 tosses of a fair coin? What are the chances of encountering such a run if there are 100 tosses?

Success runs

*
1110001111111000001011011
1011101011100111000000100
1001010010010110110001010
0010110001101000110100011

**
1110010100101010001010111
0100010011101110001010100
0100010111010100010100100
0011101010001000101111010

- ❖ What is the chance that one will see at least five consecutive heads (a “**success run of length 5**”) *somewhere* in a sequence of 50 tosses of a fair coin? What are the chances of encountering such a run if there are 100 tosses?
- ❖ Some notation:

Success runs

★

```
1110001111111000001011011
1011101011100111000000100
1001010010010110110001010
0010110001101000110100011
```

★★

```
1110010100101010001010111
0100010011101110001010100
0100010111010100010100100
0011101010001000101111010
```

- ✧ What is the chance that one will see at least five consecutive heads (a “**success run of length 5**”) *somewhere* in a sequence of 50 tosses of a fair coin? What are the chances of encountering such a run if there are 100 tosses?
- ✧ Some notation:
 - ✧ n := number of tosses.

Success runs

★

```
1110001111111000001011011
1011101011100111000000100
1001010010010110110001010
0010110001101000110100011
```

★★

```
1110010100101010001010111
0100010011101110001010100
0100010111010100010100100
0011101010001000101111010
```

- ❖ What is the chance that one will see at least five consecutive heads (a “**success run of length 5**”) *somewhere* in a sequence of 50 tosses of a fair coin? What are the chances of encountering such a run if there are 100 tosses?
- ❖ Some notation:
 - ❖ n := number of tosses.
 - ❖ r := length of success run.

Success runs

★

```
1110001111111000001011011
1011101011100111000000100
1001010010010110110001010
0010110001101000110100011
```

★★

```
1110010100101010001010111
0100010011101110001010100
0100010111010100010100100
0011101010001000101111010
```

- ✧ What is the chance that one will see at least five consecutive heads (a “**success run of length 5**”) *somewhere* in a sequence of 50 tosses of a fair coin? What are the chances of encountering such a run if there are 100 tosses?
- ✧ Some notation:
 - ✧ n := number of tosses.
 - ✧ r := length of success run.
 - ✧ $s_n(r)$:= probability that *at least one* success run of length r occurs on or before the n th trial.

Success runs

1110001111111000001011011
10111010111001111000000100
1001010010010110110001010
0010110001101000110100011

1110010100101010001010111
0100010011101110001010100
0100010111010100010100100
0011101010001000101111010

- ❖ What is the chance that one will see at least five consecutive heads (a “**success run of length 5**”) *somewhere* in a sequence of 50 tosses of a fair coin? What are the chances of encountering such a run if there are 100 tosses?
- ❖ Some notation:
 - ❖ n := number of tosses.
 - ❖ r := length of success run.
 - ❖ $s_n(r)$:= probability that *at least one* success run of length r occurs on or before the n th trial.

r	$s_{50}(r)$	$s_{100}(r)$
2	1.00	1.00
3	0.98	1.00
4	0.83	0.97
5	0.55	0.81
6	0.31	0.55
7	0.17	0.32
8	0.08	0.17
9	0.04	0.09
10	0.02	0.04

Success runs

1110001111111000001011011
10111010111001111000000100
1001010010010110110001010
0010110001101000110100011

1110010100101010001010111
0100010011101110001010100
0100010111010100010100100
0011101010001000101111010

- ❖ What is the chance that one will see at least five consecutive heads (a “**success run of length 5**”) *somewhere* in a sequence of 50 tosses of a fair coin? What are the chances of encountering such a run if there are 100 tosses?
- ❖ Some notation:
 - ❖ n := number of tosses.
 - ❖ r := length of success run.
 - ❖ $s_n(r)$:= probability that *at least one* success run of length r occurs on or before the n th trial.

r	$s_{50}(r)$	$s_{100}(r)$
2	1.00	1.00
3	0.98	1.00
4	0.83	0.97
5	0.55	0.81
6	0.31	0.55
7	0.17	0.32
8	0.08	0.17
9	0.04	0.09
10	0.02	0.04

The chance of observing a success run or a failure run or both of length 5 in 100 tosses of a fair coin exceeds 97%.