

Chapter 13 / Example 4

Binomial probabilities

For each situation, state if the random variable is distributed binomially. If so, find the probability asked for.

- A coin is biased so that the probability of a head is 0.74. The coin is tossed 7 times. A is the number of tails. Find $P(A = 5)$.
- A bag contains 12 white chocolates and 7 dark chocolates. A chocolate is selected at random and its type noted and then eaten. This is repeated 5 times. B is the number of dark chocolates eaten. Find $P(B = 7)$.
- A bag contains 10 red, 1 blue and 7 yellow dice. A dice is selected at random and its colour noted and replaced. This is repeated 12 times. C is the number of yellow dice recorded. Find $P(C \leq 6)$.
- In a multiple-choice test of 20 questions, students must select the correct answer from 5 different options. Valentina guesses each of the 20 answers. D is the number of correct answers Valentina guesses. Find $P(D \geq 10)$.
- Ciaran plays a lottery in which the probability of buying a winning ticket is 0.001. E is the number of tickets Ciaran buys until he wins a prize. Find $P(E < 7)$.

$A \sim B(7, 0.26)$. Find $P(A = 5)$.

Press **2nd** **vars** (**[distr]**) A:binompdf(.

Enter 7 as the number of trials, 0.26 as the probability of success and 5 as the X value.

Navigate down to Paste and press **enter**.

```
binompdf
trials:7
p:0.26
x value:5
Paste
```

Press **enter**.

The GDC displays the solution $P(A = 5) = 0.0137$.

```
binompdf(7,0.26,5)
.....0136631071
```

B is not binomially distributed.

$C \sim B\left(12, \frac{7}{18}\right)$. Find $P(C \leq 6)$.

Press **2nd** **vars** (**[distr]**) B:binomcdf(.

Enter 12 as the number of trials, $7 \div 18$ as the probability of success and 6 as the X value.

Navigate down to Paste and press **enter**.

```
binomcdf
trials:12
p:7/18
x value:6
Paste
```

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Press **enter**.

The GDC displays the solution $P(C \leq 6) = 0.861$.

```
binompdf(7,0.26,5)
.0136631071
binomcdf(12,7/18,6)
.8606788033
```

$D \sim B\left(20, \frac{1}{5}\right)$. Find $P(D \geq 10)$.

The binomial CDF function on the TI-84 Plus C finds the probability that D is less or equal to the given value.

To find $P(D \geq 10)$ calculate $1 - P(D \leq 9)$.

Type 1 – and press **2nd** **vars** (**[distr]**) B:binomcdf(.

Enter 20 as the number of trials, $1 \div 5$ as the probability of success and 9 as the X value.

Navigate down to Paste and press **enter**.

```
binomcdf
trials:20
p:1/5
x value:9
Paste
```

Press **enter**.

The GDC displays the solution $P(D \geq 10) = 0.00259$.

```
binompdf(7,0.26,5)
.0136631071
binomcdf(12,7/18,6)
.8606788033
1-binomcdf(20,1/5,9)
.0025948274
```

E is not binomially distributed.