

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 **MENU** 2 **STAT** to display the List Editor screen.

Press **F5** DIST **F5** BINOMIAL **F1** Bpd.

Choose **F2** Var.

Enter 5 as the value of x , 7 as Numtrial and 0.26 as p .

Choose **F1** None for Save Res.

```
Binomial P.D
Data : Variable
x : 5
Numtrial : 7
p : 0.26
Save Res: None
Execute
[CALC]
```

Navigate down to Execute and press **EXE**.

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

```
Binomial P.D
p=0.0136631
```

B is not binomially distributed.

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

Press **[EXIT]** twice to display the List Editor screen.

Press **[F5]** DIST **[F5]** BINOMIAL **[F2]** Bcd.

Choose **[F2]** Var.

Enter 0 as Lower, 6 as Upper, 12 as Numtrial and $7 \div 18$ as p.

Choose **[F1]** None for Save Res.

```
Binomial C.D
Data :Variable
Lower :0
Upper :6
Numtrial:12
p :0.38888888
Save Res:None
[None] LIST
```

Navigate down to Execute and press **[EXE]**.

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

```
Binomial C.D
p=0.8606788
```

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

Press **[EXIT]** twice to display the List Editor screen.

Press **[F5]** DIST **[F5]** BINOMIAL **[F2]** Bcd.

Choose **[F2]** Var.

Enter 10 as Lower, 20 as Upper, 20 as Numtrial and $1 \div 5$ as p.

Choose **[F1]** None for Save Res.

```
Binomial C.D
Data :Variable
Lower :10
Upper :20
Numtrial:20
p :0.2
Save Res:None
[None] LIST
```

Navigate down to Execute and press **[EXE]**.

The GDC displays the solution

$P(D \geq 10) = 2.59 \times 10^{-3} = 0.00259$.

```
Binomial C.D
p=2.5948x10^03
```

E is not binomially distributed.