

Chapter 13 / Example 5

Binomial probabilities

- a** In a family of six children, find
- the probability that there are exactly three girls
 - the probability that exactly three consecutive girls are born.
- b** A study shows that 0.9% of a population of over 4 000 000 carries a virus. Find the smallest size of sample from the population required in order that the probability of the sample having no carriers is less than 0.4.

$G \sim B(6, 0.5)$. Find $P(G = 3)$.

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

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

Choose **F2** Var.

Enter 3 as the value of x, 6 as Numtrial and 0.5 as p.

Choose **F1** None for Save Res.

```
Binomial P.D
Data :Variable
x :3
Numtrial:6
p :0.5
Save Res:None
Execute
[CALC]
```

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

The GDC displays the solution $P(G = 3) = 0.3125$.

```
Binomial P.D
p=0.3125
```

$$P(3 \text{ consecutive girls}) = 4 \times \left(\frac{1}{2}\right)^6 = 0.0625.$$

$C \sim B(n, 0.009)$. Find $P(C = 0) < 0.4$.

Press **MENU** 7 **TABLE**. Press **F5** SET and change the settings so that the table starts from 1 and ends at 120.

Press **EXIT**.

```
Table Setting
X
Start:1
End :120
Step :1
```

Press **OPTN** **F6** \triangleright **F5** STAT **F1** DIST **F5** BINOMIAL **F2** Bcd.

Type 0, 0, x, 0.009. Close the parentheses and press **EXE** to enter the equation as Y1.

```
Table Func :Y=
Y1:BinomialCD(0,[—])
Y2:[—]
Y3:[—]
Y4:[—]
Y5:[—]
Y6:[—]
[SELECT] [DELETE] [TYPE] [STYLE] [SET] [TABLE]
```

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Press **F6** TABLE.

A table of values is displayed.

Scroll down with **▼**.

From the table, you can see that $n = 102$ is the first value for which $P(C = 0) < 0.4$.

Hence $n = 102$ is the minimum value required.

X	Y1
100	0.4049
101	0.4012
102	0.3978
103	0.394

102

FORMULA DELETE ROW EDIT GPH-CON GPH-PLT