

TG 1 State whether the following binomial distributions can or cannot be reasonably approximated by a normal distribution.

Write a brief calculation to justify your conclusion in each case:

(a) Bin(50, 0.2)

(b) Bin(60, 0.1)

(c) Bin(70, 0.01)

(d) Bin(30, 0.7)

(e) Bin(40, 0.9)

(a) $n = 50$ and $p = 0.2$

$$np = 50 \times 0.2 = 10 \geq 10$$

$$nq = 50 \times (1 - 0.2) = 40 > 10$$

As $np \geq 10$ and $nq > 10$, the binomial distribution can be approximated by a normal distribution.

(b) $n = 60$ and $p = 0.1$

$$np = 60 \times 0.1 = 6 < 10$$

As $np < 10$, the binomial distribution cannot be approximated by a normal distribution.

(c) $n = 70$ and $p = 0.01$

$$np = 70 \times 0.01 = 0.7 < 10$$

As $np < 10$, the binomial distribution cannot be approximated by a normal distribution.

(d) $n = 30$ and $p = 0.7$

$$np = 30 \times 0.7 = 21 \geq 10$$

$$nq = 30 \times (1 - 0.7) = 9 < 10$$

As $np > 10$ but $nq < 10$, the binomial distribution cannot be approximated by a normal distribution.

(e) $n = 40$ and $p = 0.9$

$$np = 40 \times 0.9 = 36 > 10$$

$$nq = 40 \times (1 - 0.9) = 4 < 10$$

As $np > 10$ but $nq < 10$, the binomial distribution cannot be approximated by a normal distribution.

* These solutions have been provided by [projectmaths](http://projectmaths.com.au) and are not supplied or endorsed by NESA.

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