

Binomialverteilung

LS S. 362 Nr. 7

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|-------------------|--------------------------------------|
| p: | Erfolgswahrscheinlichkeit |
| X: | Anzahl der Erfolge |
| q = 1 - p: | Misserfolgswahrscheinlichkeit |
| Y: | Anzahl der Misserfolge |

a)

| | | |
|---|-----|------------|
| n = | 100 | P(X = a) |
| p = | 0,6 | q = 0,4 |
| a = | 60 | n - a = 40 |
| b = | | |
| P(X = 60) = P(Y = 40) = P(Y ≤ 40) - P(Y ≤ 39) = 0,5433 - 0,4621 = 0,0812 | | |

b)

| | | |
|---|-----|------------|
| n = | 100 | P(X < a) |
| p = | 0,6 | q = 0,4 |
| a = | 60 | n - a = 40 |
| b = | | |
| P(X < 60) = P(Y > 40) = 1 - P(Y ≤ 40) = 1,0000 - 0,5433 = 0,4567 | | |

c)

| | | |
|---|-----|------------|
| n = | 100 | P(X > a) |
| p = | 0,6 | q = 0,4 |
| a = | 60 | n - a = 40 |
| b = | | |
| P(X > 60) = P(Y < 40) = P(Y ≤ 39) = 0,5433 | | |

d)

| | | |
|---|-----|--------------|
| n = | 100 | P(a ≤ X ≤ b) |
| p = | 0,6 | q = 0,4 |
| a = | 51 | n - a = 49 |
| b = | 69 | n - b = 31 |
| P(51 ≤ X ≤ 69) = P(31 ≤ Y ≤ 49) = P(Y ≤ 49) - P(Y ≤ 30) = 0,9729 - 0,0248 = 0,9481 | | |

e)

| | | |
|---|-----|--------------|
| n = | 100 | P(a ≤ X ≤ b) |
| p = | 0,6 | q = 0,4 |
| a = | 50 | n - a = 50 |
| b = | 70 | n - b = 30 |
| P(50 ≤ X ≤ 70) = P(30 ≤ Y ≤ 50) = P(Y ≤ 50) - P(Y ≤ 29) = 0,9832 - 0,0148 = 0,9685 | | |

| | | |
|-----|--|--|
| n = | | |
| p = | | |
| a = | | |
| b = | | |
| | | |

$P(X < 50 \text{ oder } X > 70) = 1 - P(50 \leq X \leq 70) = 1 - 0,9685 = 0,0315$