

Joint Discrete Distributions

Use the complete labeled joint PMF table. Show normalization, requested sums, and marginal products before deciding independence.

1.

3x3 table. Rows $X=68,69,70$; columns $Y=166,167,168$; weights / 36: 1,2,3 / 2,4,6 / 3,6,9. Find the full conditional PMF of Y given $X=70$.

Assumptions: The displayed support is complete; omitted pairs have probability 0.
Independence requires equality in every cell.

2.

2x3 table. Rows $X=82,83$; columns $Y=194,195,196$; weights / 18: 1,2,3 / 2,4,6. Find $F(82,195)$.

Assumptions: The displayed support is complete; omitted pairs have probability 0.
Independence requires equality in every cell.

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3. 2x3 table. Rows $X=7,8$; columns $Y=44,45,46$; weights / 45: 6,11,5 / 10,4,9. Find $E(X)$, $E(Y)$, $E(XY)$.

Assumptions: The displayed support is complete; omitted pairs have probability 0.
Independence requires equality in every cell.

4. 2x2 table. Rows $X=12,13$; columns $Y=54,55$; weights / 9: 1,2 / 2,4. Find $P(X=13 \text{ or } Y=54)$.

Assumptions: The displayed support is complete; omitted pairs have probability 0.
Independence requires equality in every cell.

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5. 2x3 table. Rows $X=4,5$; columns $Y=38,39,40$; weights / 18: 1,2,3 / 2,4,6. Are X and Y independent? Check every cell.

Assumptions: The displayed support is complete; omitted pairs have probability 0.
Independence requires equality in every cell.

6. 2x3 table. Rows $X=-65,-64$; columns $Y=-100,-99,-98$; weights / 26: 0,4,9 / 3,8,2. Find both full marginal PMFs.

Assumptions: The displayed support is complete; omitted pairs have probability 0.
Independence requires equality in every cell.

Joint Discrete Distributions

Use the complete labeled joint PMF table. Show normalization, requested sums, and marginal products before deciding independence.

7. 3x3 table. Rows $X=-52,-51,-50$; columns $Y=-74,-73,-72$; weights / 36: 1,2,3 / 2,4,6 / 3,6,9. Find c and identify zero-probability cells.

Assumptions: The displayed support is complete; omitted pairs have probability 0.
Independence requires equality in every cell.

8. 2x3 table. Rows $X=43,44$; columns $Y=116,117,118$; weights / 33: 4,9,3 / 8,2,7. Find both full marginal PMFs.

Assumptions: The displayed support is complete; omitted pairs have probability 0.
Independence requires equality in every cell.

Joint Discrete Distributions

Worked Answer Key

Use the complete labeled joint PMF table. Show normalization, requested sums, and marginal products before deciding independence.

1.

3x3 table. Rows $X=68,69,70$; columns $Y=166,167,168$; weights / 36: 1,2,3 / 2,4,6 / 3,6,9. Find the full conditional PMF of Y given $X=70$.

Assumptions: The displayed support is complete; omitted pairs have probability 0.
Independence requires equality in every cell.

Answer: $P(Y=166|X=70)=0.1667$, $P(Y=167|X=70)=0.3333$, $P(Y=168|X=70)=0.5000$

1. Divide the row by 0.5000.

2. $P(Y=166|X=70)=0.1667$, $P(Y=167|X=70)=0.3333$, $P(Y=168|X=70)=0.5000$

3. It is 0 outside displayed support.

2.

2x3 table. Rows $X=82,83$; columns $Y=194,195,196$; weights / 18: 1,2,3 / 2,4,6. Find $F(82,195)$.

Assumptions: The displayed support is complete; omitted pairs have probability 0.
Independence requires equality in every cell.

Answer: 0.1667

1. Sum the 1x2 lower-left cells, restricting both coordinates: 0.1667.

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3. 2x3 table. Rows $X=7,8$; columns $Y=44,45,46$; weights / 45: 6,11,5 / 10,4,9. Find $E(X)$, $E(Y)$, $E(XY)$.

Assumptions: The displayed support is complete; omitted pairs have probability 0.
Independence requires equality in every cell.

Answer: $E(X)=7.5111$, $E(Y)=44.9556$, $E(XY)=337.6667$

1. Sum over every cell.
2. $E(X)=7.5111$, $E(Y)=44.9556$, $E(XY)=337.6667$

4. 2x2 table. Rows $X=12,13$; columns $Y=54,55$; weights / 9: 1,2 / 2,4. Find $P(X=13 \text{ or } Y=54)$.

Assumptions: The displayed support is complete; omitted pairs have probability 0.
Independence requires equality in every cell.

Answer: 0.7778

1. Add row and column, subtracting overlap: 0.7778.

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5. 2x3 table. Rows $X=4,5$; columns $Y=38,39,40$; weights / 18: 1,2,3 / 2,4,6. Are X and Y independent? Check every cell.

Assumptions: The displayed support is complete; omitted pairs have probability 0.
Independence requires equality in every cell.

Answer: independent

1. Cells: 0.0556,0.1111,0.1667,0.1111,0.2222,0.3333.
2. Products: 0.0556,0.1111,0.1667,0.1111,0.2222,0.3333.
3. Every cell must match: independent.

6. 2x3 table. Rows $X=-65,-64$; columns $Y=-100,-99,-98$; weights / 26: 0,4,9 / 3,8,2. Find both full marginal PMFs.

Assumptions: The displayed support is complete; omitted pairs have probability 0.
Independence requires equality in every cell.

Answer: pX: 0.5000,0.5000; pY: 0.1154,0.4615,0.4231

1. Sum every row and column.
2. pX: 0.5000,0.5000; pY: 0.1154,0.4615,0.4231

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Use the complete labeled joint PMF table. Show normalization, requested sums, and marginal products before deciding independence.

7. 3x3 table. Rows X=-52,-51,-50; columns Y=-74,-73,-72; weights / 36: 1,2,3 / 2,4,6 / 3,6,9. Find c and identify zero-probability cells.

Assumptions: The displayed support is complete; omitted pairs have probability 0.
Independence requires equality in every cell.

Answer: c=0.0278

1. $c=1/36=0.0278$.
2. Zero cells: none.

8. 2x3 table. Rows X=43,44; columns Y=116,117,118; weights / 33: 4,9,3 / 8,2,7. Find both full marginal PMFs.

Assumptions: The displayed support is complete; omitted pairs have probability 0.
Independence requires equality in every cell.

Answer: pX: 0.4848,0.5152; pY: 0.3636,0.3333,0.3030

1. Sum every row and column.
2. pX: 0.4848,0.5152; pY: 0.3636,0.3333,0.3030