

## PART I.

The joint discrete density of integer-valued random variables  $X$  and  $Y$  is given by

$$P[X = x, Y = y] = Cy \binom{y}{x} (1/3)^x (2/3)^{y-x} \text{ for integers } x, y: y = 1, 2, 3 \text{ and } 0 \leq x \leq y$$

- i. Compute the value of the constant  $C$ 
  - a. By first summing over  $x$  for fixed  $y$  and then summing over  $y$  **OR**
  - b. After carefully constructing the first table from the formula above w/o the constant  $C$ . Entries are proportional to probabilities.

**Then produce the (second) joint probability table blow.**

| Y     | X |  |  |  | TOTAL |
|-------|---|--|--|--|-------|
|       |   |  |  |  |       |
|       |   |  |  |  |       |
|       |   |  |  |  |       |
|       |   |  |  |  |       |
| TOTAL |   |  |  |  |       |

**Table 2: JOINT PROBABILITY TABLE**

| Y     | X |  |  |  | TOTAL |
|-------|---|--|--|--|-------|
|       |   |  |  |  |       |
|       |   |  |  |  |       |
|       |   |  |  |  |       |
|       |   |  |  |  |       |
| TOTAL |   |  |  |  |       |

- ii. Compute the probability  $P[X+Y \leq 4]$