

**Instructions:** Solve the following problems regarding the requested order during your lecture.

(4<sup>pts</sup>) **1.** Use  $c_i$ ,  $r_j$ , and  $n_{i,j}$  to compute the following probabilities using their relative frequencies :

1. joint probability  $p(X = x_i, Y = y_i)$  using  $n_{i,j}$ :
2. marginal probability  $p(X = x_i)$  using  $c_i$ :
3. marginal probability  $p(X = x_i)$  using  $n_{i,j}$ :

4 pts

(4<sup>pts</sup>) **2.** Suppose that we have three colored boxes r (red), b (blue), and g (green). Box r contains 3 apples, 4 oranges, and 3 limes, box b contains 1 apple, 1 orange, and 0 limes, and box g contains 3 apples, 3 oranges, and 4 limes. If a box is chosen at random with probabilities  $p(r) = 0.2$ ,  $p(b) = 0.2$ ,  $p(g) = 0.6$ , and a piece of fruit is removed from the box (with equal probability of selecting any of the items in the box), then what is the probability of selecting an apple? (Use Bayesian equation for that)

4 pts

(4<sup>pts</sup>) **3.** Write down the Bayesian equation. Label the individual parts with posterior, prior, and likelihood:

4 pts

(4<sup>pts</sup>) **4.** What is the difference between a continuous and discrete random variable.

4 pts

(4<sup>pts</sup>) **5.** How can we compute the probability that a continuous random variable takes a value in the range between a and b given that you know its probability density

4 pts