For numerical answers with decimal digits please read instructions.

- 1. At table tennis tournament there are 98 players. Assume that birthrates are constant throughout the year and that each year has 365 days. Probability that more than two players were born on Republic day is _____. *Give your answer rounded up to four decimal digits.*
- 2. A new breathe test for SARS-COV2 detection is known to be 90% reliable when the person is infected with COVID-19 and 99% reliable when the person does not have COVID-19. Suppose it is estimated that 5% of the population have COVID-19 and a person tests postive with the breathe test then the the probability that she does not have COVID-19 is equal to $\frac{(i)}{(ii)}$.

The above fraction should be in the simplest form, i.e. g.c.d $\{(i), (ii)\} = 1$.

- 3. Suppose a fair coin is tossed 15 times.
 - (a) $\mathbb{P}(\{4 \text{ heads occur}\} | \{3 \text{ or } 4 \text{ heads occur}\}) \text{ is } \left| \begin{array}{c} (i) \\ (ii) \end{array} \right|$

The above fraction should be in the simplest form, i.e. $g.c.d \{ (i), (ii) \} = 1$.

(b) If k be a number between 2 and 10, then

$$\mathbb{P}(\{k-1 \text{ heads occur}\} | \{k-1 \text{ or } k \text{ heads occur}\}) \times \left(\frac{8}{k}\right) \text{ is } \left[\frac{(i)}{(ii)}\right]$$

The above fraction should be in the simplest form, i.e. $g.c.d \{ (i), (ii) \} = 1$. (c) If k be a number between 2 and 10, then

$$\mathbb{P}(\{k \text{ heads occur}\} | \{k-1 \text{ or } k \text{ heads occur}\}) \times \left(\frac{32}{16-k}\right) \text{ is } \underline{\qquad}.$$

- (d) Is it true that the answer to part(b) depends on k?
- (e) Is it true that the answer to part(c) does not depend on k?
- 4. Let A and B be events with P(A) = 0.8 and P(B) = 0.7. The value of $P(A \cap B)$ if A and B are independent is ______ Give your answer rounded up to two decimal digits
- 5. Suppose we toss two fair dice. Let E_1 denote the event that the sum of the dice is six. E_2 denote the event that sum of the dice equals seven. Let F denote the event that the first die equals four.
 - (a) Is it true that E_1 independent of F?

- (b) Is it true that E_2 independent of F?
- 6. At a Kabbadi tournament there are 98 players. Assume that birthrates are constant throughout the year and that each year has 365 days. Probability that strictly more than two players were born on Republic day can be calculated in R using basic operations and the choose(n,k) function. Evaluate the expression and choose the correct answer.

> 1-(choose(98,0)*364^98+choose(98,1)*364^97+choose(98,2)*364^96)/365^98

- (a) [1] 0.002593
- (b) [1] 0.002575
- (c) [1] 0.002614
- (d) [1] 0.002658
- 7. At a table tennis tournament there are 120 players. Assume that birthrates are constant throughout the year and that each year has 365 days. Calculate the probability that strictly more than *three* players were born on Independence Day in R and choose the correct answer.
 - (a) [1] 0.0002916
 - (b) [1] 0.0003593
 - (c) [1] 0.0002739
 - (d) [1] 0.0003437