Assignment 1

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1) A die is thrown, find the probability of following events:
   a) A prime number will appear
   b) A number greater than or equal to 3 will appear
   c) A number less than or equal to one will appear
   d) A number more than 6 will appear
   e) A number less than 6 will appear

   Solution: The given information is summarized in the following table 1

RV	Description	Probability
$X = 1$	Die rolls to 1	$\frac{1}{3}$
$X = 2$	Die rolls to 2	$\frac{1}{2}$
$X = 3$	Die rolls to 3	$\frac{1}{6}$
$X = 4$	Die rolls to 4	$\frac{1}{6}$
$X = 5$	Die rolls to 5	$\frac{1}{6}$
$X = 6$	Die rolls to 6	$\frac{1}{6}$

TABLE 1: Random variable X

   a) The set of possible prime numbers in a die roll contains 2,3,5

$$\Pr(X \in \{2,3,5\}) = \Pr(X = 2) + \Pr(X = 3) + \Pr(X = 5) \tag{0.0.1}$$

$$= \frac{1}{2} \tag{0.0.2}$$

   b) The set of possible numbers greater than or equal to 3 contains 3,4,5,6

$$\Pr(X \in \{3,4,5,6\}) = 1 - \Pr(X \in \{1,2\}) \tag{0.0.3}$$

$$= 1 - (\Pr(X = 1) + \Pr(X = 2)) \tag{0.0.4}$$

$$= \frac{2}{3} \tag{0.0.5}$$

   c) The set of possible numbers less than or equal to 1 just contains 1

$$\Pr(X \in \{1\}) = \Pr(X = 1) \tag{0.0.6}$$

$$= \frac{1}{6} \tag{0.0.7}$$

   d) The set of possible numbers more than 6 is a null set

$$\Pr(X \in \phi) = 0 \tag{0.0.8}$$

   e) The set of possible numbers less than 6 contains 1,2,3,4,5

$$\Pr(X \in \{1,2,3,4,5\}) = 1 - \Pr(X \in \{6\}) \tag{0.0.9}$$

$$= \frac{5}{6} \tag{0.0.10}$$