Assignment 1

Jaswanth Chowdary Madala

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

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 probability that a number greater than or equal to 3 will appear is given by

$$\Pr(X \geq 3) = 1 - \Pr(X \leq 2) \tag{0.0.3}$$

$$= 1 - \frac{1}{3} \tag{0.0.4}$$

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

   c) The probability that a number less than or equal to 1 will appear is given by

$$\Pr(X \leq 1) = \frac{1}{6} \tag{0.0.6}$$

   d) The probability that a number greater than 6 will appear is given by

$$\Pr(X > 6) = 1 - \Pr(X \leq 6) \tag{0.0.7}$$

$$= 0 \tag{0.0.8}$$

   e) The probability that a number less than 6 will appear is given by

$$\Pr(X < 6) = \Pr(X \leq 5) \tag{0.0.9}$$

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