

COMP406, Simulation and Modeling  
HW-3 Spring 2015

For each of the systems:

1. A discrete random variable  $X$  takes the following values with the corresponding probabilities:

$$X \mid \begin{array}{cccccc} -2 & -1 & 0 & 1 & 2 & 3 \end{array}$$

$$P \mid \begin{array}{cccccc} 0.1 & 0.05 & 0.4 & 0.2 & 0.1 & 0.15 \end{array}$$

compute the following:

- (a)  $P(X \leq 0)$
  - (b)  $P(1 \leq X^2 \leq 5)$
  - (c)  $P(|X| = 1/X > 0)$
  - (d) Plot the probability function of  $X$  : the plot consists of 6 vertical segments (bars), whose top points are not connected.
  - (e) Plot the probability function of  $Y = X^2$
2. Suppose only 1% of lottery tickets wins. Is it enough to buy 100 tickets to ensure that at least one wins?
    - (a) Suppose Jim buys 100 tickets. What is the chance that he wins?
    - (b) How many tickets one needs to buy to make sure that at least one wins with probability
    - (c) Suppose Bob buys 250 tickets. How many of them on average will win? What is the chance that at least two tickets win? What is the chance that at most two tickets win?
  3. Suppose  $Z$  has a standard normal distribution. Use the table to find
    - (a)  $P(-1.1 < Z < 2.95)$ ,
    - (b)  $P(Z > -0.69)$ ,
    - (c)  $P(-1.45 < Z < -0.28)$ ,
    - (d)  $P(|Z| \leq 2.5)$ .
  4. Solve problem 4.2 in the book
  5. Solve problem 4.4 in the book