CS 333202: Probability and Statistics
HW3 part I

1. $P(X < 1) = F(1-) = 1/2$
   $P(X = 1) = F(1) - F(1-) = 1/6$
   $P(1 \leq X < 2) = F(2-) - F(1-) = 1/4$
   $P(X > 1/2) = 1 - F(1/2) = 1 - 1/2 = 1/2$
   $P(X = 3/2) = 0$
   $P(1 < X \leq 6) = F(6) - F(1) = 1 - 2/3 = 1/3$

2. Let the departure time of the last flight before the passenger arrives be 0. Then Y , the arrival time of the passenger is a random number from (0, 45). The waiting time is $X = 45 - Y$. We have that for $0 \leq t \leq 45$,

$$P(X \leq t) = P(45 - Y \leq t) = P(Y \geq 45 - t) = \frac{45-(45-t)}{45} = \frac{t}{45}$$

   So F, the distribution of X is

$$F(t) = \begin{cases} 0 & t < 0 \\ \frac{t}{45} & 0 \leq t < 45 \\ 1 & t \geq 45. \end{cases}$$

3. Let X be the minimum of the three numbers,

$$P(X < 5) = 1 - P(X \geq 5) = 1 - \frac{\binom{36}{3}}{\binom{40}{3}} = 0.277$$