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Assignment 4

$$\frac{60}{60} + \frac{30}{60} + \frac{10}{60} + \frac{15}{60} + \frac{12}{60} + \frac{10}{60} = \frac{147}{60}$$
$$\frac{1}{1} + \frac{1}{2} + \frac{1}{3} + \frac{1}{4} + \frac{1}{5} + \frac{1}{6} = \frac{20}{12}$$
$$\frac{147}{60} = \frac{49}{20}$$

1.A

$$P_A(a) = \begin{cases} \frac{1}{a} \cdot \frac{20}{49} & a = \{1, 2, 3, 4, 5, 6\} \\ 0 & \text{else} \end{cases}$$

1.B

$$P_A(\text{even}) = P_A(2) + P_A(4) + P_A(6) = \frac{1}{2} + \frac{1}{4} + \frac{1}{6} = \frac{20}{49} = 0.373$$

2.A

$$P[\text{non-negative}] = 0.2 + 0.15 + 0.05 + 0.1 + 0.15 + 0.05 = 0.7$$

2.B

$$P[\text{NK} \#4] = .15 + .1 + .05 + .2 + .15 + .05 = 0.7$$

2.C

$$P[\text{positive, odd}] = .15 + .05 + .1 + .15 = .45$$

3.

$$D = \{0, 1, 2, 3, 4\}$$

$$A. P_D(d) = \begin{cases} \binom{4}{d} (0.07)^d (1-0.07)^{4-d} & d = 0, 1, 2, 3, 4 \\ 0 & \text{else} \end{cases}$$

$$P_D(0) = 0.748$$

$$P_D(1) = 0.225$$

$$P_D(2) = 0.0254$$

$$P_D(3) = 0.001$$

$$P_D(4) = 0.00002 \\ \approx 0.000$$

RV D is a Binomial RV

$$B. P[\text{Failure}] = 1 - P[\text{Success}] = 1 - 0.748 = \boxed{0.252}$$

4.A f S_f
Pascal F , $\mathbb{F} = \{3, 4, 5, 6\}$ $\mathbb{S} = \{0, 1, 2, 3\}$

$$P_F(f) = \begin{cases} \binom{f-1}{2} (.4)^2 (.6)^{f-3} & f \in [3, 6] \\ 0 & \text{else} \end{cases}$$

B.

$$P_F(3) + P_F(4) + P_F(5) + P_F(6) = \boxed{.7245}$$

100

S.A

Assume Poisson

$$T = 3 \text{ minutes}$$

$$\lambda = 100 \text{ customers / 60 minutes}$$

$$\alpha = \frac{100}{60} \cdot 3 = 5$$

$$P_c(0) = \frac{5^0 e^{-5}}{0!} = 0.006$$

S.B

$$\frac{100}{60} \cdot 2 = 3.33$$

$$P_c(0) = \frac{3.33^0 e^{-3.33}}{0!} = 0.04$$

$$\frac{100}{60} \cdot 1 = 1.66$$

$$P_c(0) = \frac{1.66^0 e^{-1.66}}{0!}$$

$$\frac{100}{60} \cdot \frac{1}{2} = \frac{100}{120} = 0.83$$

$$P_c(0) = \frac{0.83^0 e^{-0.83}}{0!} = 0.436$$

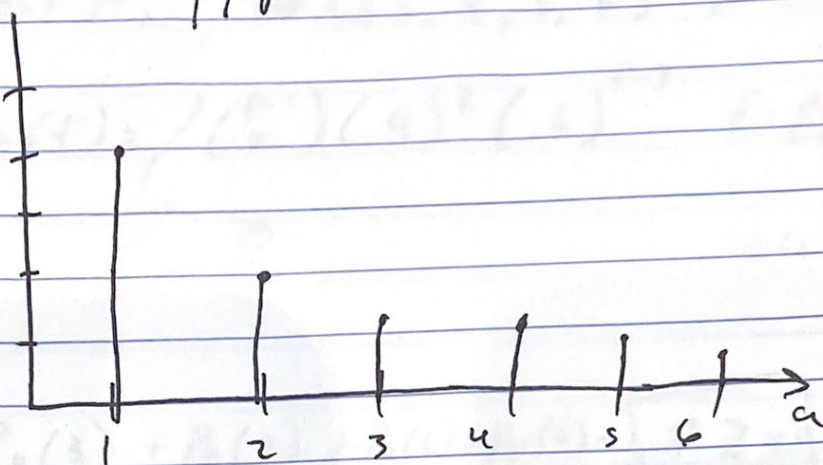
~ 30 seconds

6.A

$P_A(u)$

PMF

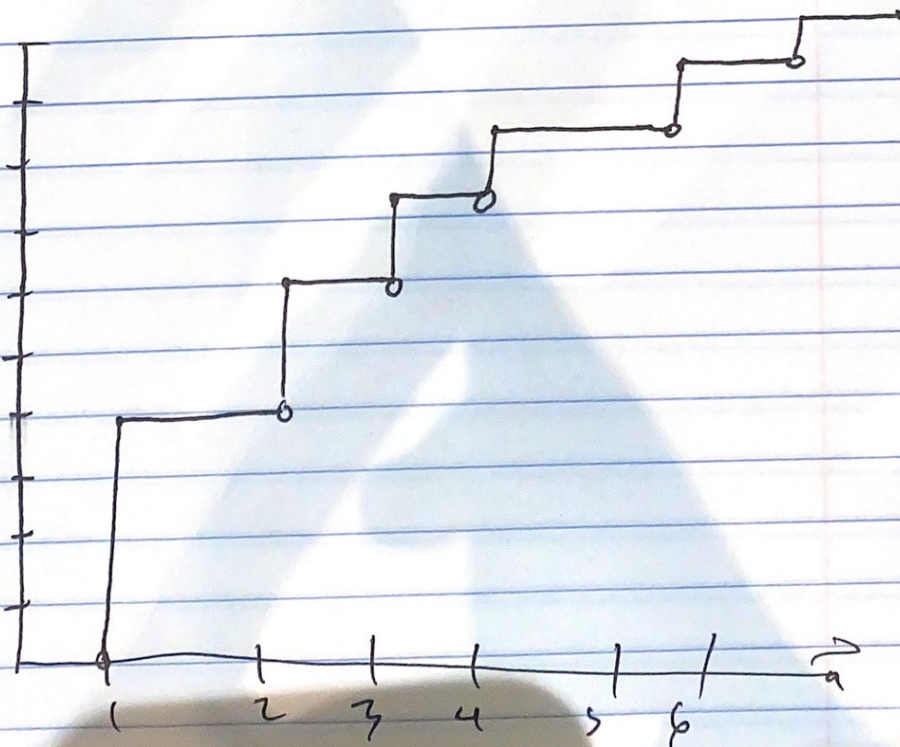
.5



CDF

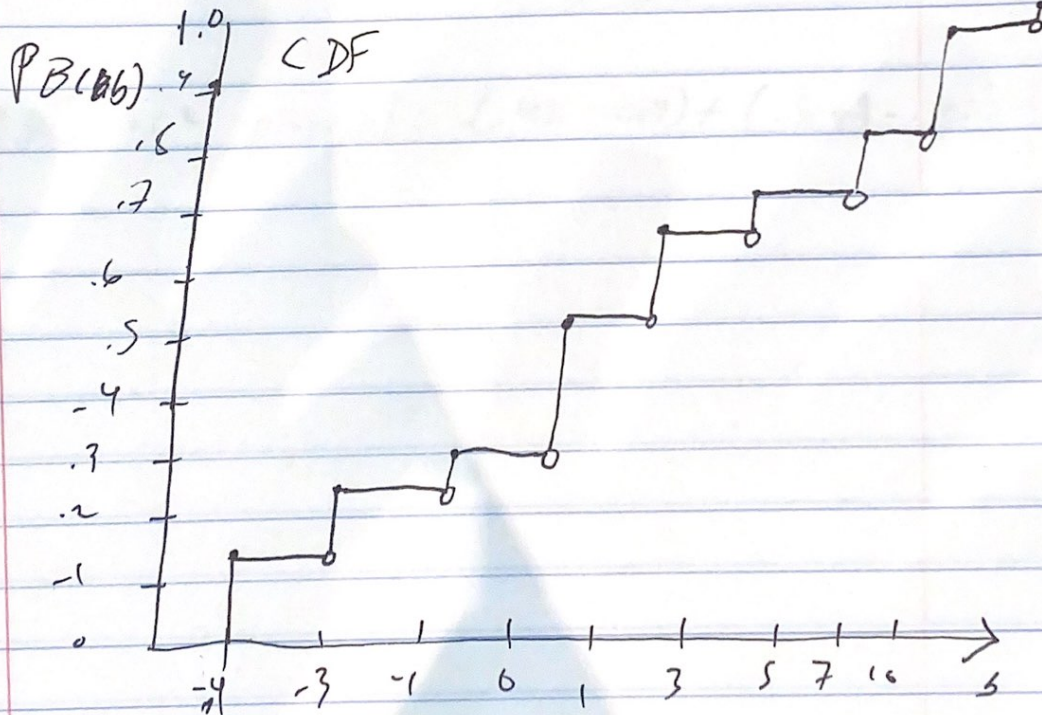
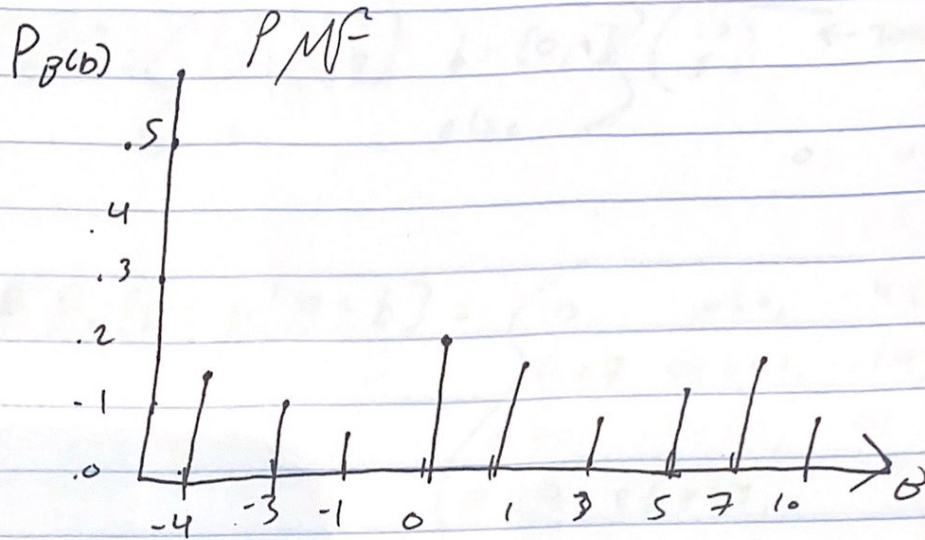
$P_A(u)$

1





6.B



15

$$\binom{8}{5-b} \binom{4}{b}$$

7. A

$$P_B(b) = \begin{cases} \frac{\binom{8}{5-b} \binom{4}{b}}{\binom{15}{5}} & b = [0, 4] \\ 0 & \text{else} \end{cases} \quad \frac{\binom{15}{5}}{\binom{15}{5} \binom{15-5}{5-b}} \leftarrow \text{Total \# balls}$$

$$0: .07$$

$$.35$$

$$F_B(b) = P[B \leq b] = \begin{cases} 0 & x < 0, .42 \\ 0.07 & 0 \leq x < 1, .14 \\ 0.42 & 1 \leq x < 2, .01 \\ 0.84 & 2 \leq x < 3, \\ 0.98 & 3 \leq x < 4, \\ 1 & x \geq 4 \end{cases}$$

$$B. P[1 \text{ or } 2 \text{ players}] = (.42 - .07) + (.84 - .42) = \boxed{0.77}$$