Stat13 HW3 Solutions

HW3.1

1. n=10 (5 points), p=5% (5 points)

2. Four assumptions (2.5 points each):
   A. Two outcomes, i.e., disk drive malfunctioning and functioning
   B. Constant disk drive malfunctioning rate, i.e., p=5%
   C. Independence, i.e., disk drive malfunctioning independent of one another
   D. Fixed sample size, i.e., n=10

3. Yes (10 points)

4. Probabilities (5 points each)
   A. $P(X=0)=\binom{10}{0}0.05^{0}0.95^{10}=0.5987$
   B. $P(X=1)=\binom{10}{1}0.05^{1}0.95^{9}=0.3151$
   C. $P(X\geq 2)=1-P(X=0)-P(X=1)=1-0.5987-0.3151$
   D. $P(2\leq X\leq 5)=P(X=2)+P(X=3)+P(X=4)+P(X=5)=0.0746+0.0105+0.00096+0.00006$
   $=0.08612$

HW3.2

1. $P(H_B)=9\%$ (10 points)

2. $P(H_A \cap W_A)=P(H_A)*P(W_A)=0.4*0.4=16\%$ (10 points)

3. $P(H_{AB} \cap W_{AB})=P(H_{AB})+P(W_{AB})-P(H_{AB} \cap W_{AB})=0.02+0.02+0.02^2=3.96\%$ (15 points)

4. $P(H_A \cap W_A) \cap P(H_B \cap W_B) \cap P(H_o \cap W_o) \cap (H_{AB} \cap W_{AB})$
   $=P(H_A)*P(W_A)+P(H_B)*P(W_B)+P(H_o)*P(W_o)+P(H_{AB})*P(W_{AB})$
   $=0.4^2+0.09^2+0.49^2+0.02^2$
   $=40.86\%$ (15 points)