

HW 1

SOLUTION

TST

18 PTS

2.1-2

$$\frac{30}{125} : A, \quad \frac{40}{125} : B, \quad \frac{35}{125} : C, \quad \frac{15}{125} : D, \quad \frac{5}{125} : F$$

Relative Frequencies are 0.24, 0.32, 0.28, 0.12, 0.04

3 pts

$$P(\text{GRADE} \geq C) = P(\text{GRADE} = A) + P(\text{GRADE} = B) + \cancel{P(\text{GRADE} = C)} + \cancel{P(\text{GRADE} = D)} + \cancel{P(\text{GRADE} = F)}$$

$$= 0.24 + 0.32 + \cancel{0.28} + \cancel{0.12} + \cancel{0.04} = \frac{70}{125} = 0.56$$

Should be possible to sum

2.1-4

1000 tickets, 10 winning tickets, buy 5 tickets

there are $\binom{1000}{5}$ ways to select 5 tickets out of 1000.

(a) If exactly one ticket out of 5 is a winning ticket, then 4 out of 5 tickets are not winning tickets.

There are ~~10~~ 10 winning tickets and 990 not-winning tickets.

Thus there are $\binom{990}{4}$ ways to choose 4 not-winning tickets out

$\binom{10}{1}$ to choose the winning one.

$$P(\text{exactly 1 winning ticket}) = \frac{\binom{10}{1} \binom{990}{4}}{\binom{1000}{5}} = \frac{(10 \cdot 990 \cdot 989 \cdot 988 \cdot 987) / 4!}{1000 \cdot 999 \cdot 998 \cdot 997 \cdot 996 / 5!}$$

$$\approx 0.048$$

(b) ~~There~~ There are $\binom{990}{5}$ ways of choosing a not-winning ticket

3 pts

$$P(\text{no win}) = \frac{\binom{990}{5}}{\binom{1000}{5}} = \frac{990 \cdot 989 \cdot 988 \cdot 987 \cdot 986}{1000 \cdot 999 \cdot 998 \cdot 997 \cdot 996} \approx 0.951$$

Thus

$$P(\text{At least 1 win}) = 1 - P(\text{no win}) = 0.049$$

2.1-7

Choose 13 cards out of 52

(a) $B_1 = 4$ spades, 4 hearts, 3 diamonds, 2 clubs

3pts

$$P(B_1) = \frac{\binom{13}{4} \binom{13}{4} \binom{13}{3} \binom{13}{2}}{\binom{52}{13}} = 0.0180$$

(b) $B_2 = 13$ cards of same suits

3pts

$$P(B_2) = \frac{4}{\binom{52}{13}} = 6.299 \cdot 10^{-12}$$

2.1-8

~~P(A ∪ B)~~

$$P(A \cup B) = P(A) + P(B) - P(A \cap B)$$

Note:

$$P(A \cup B) = P(S) = 1$$

$$\begin{aligned} P(A \cap B) &= P(A) + P(B) - P(A \cup B) \\ &= 0.7 + 0.8 - 1 = 0.5 \end{aligned}$$

3pts