Homework

9.1 + 9.2

1.) a.) {(HHHH), (HHTH), (HTHH), (HTTH)} $\left(\frac{4}{16}\right) = \frac{1}{4}$ $\left(\frac{8}{8}\right)$ or $\left(\frac{8}{8}\right)$

b.) {(HHTT)(HHHH)(HHTH)(HHHT)(THHH)(THHT)(TTHH) (HTHH) $\left(\frac{8}{12}\right)$ $\left(\frac{8}{16}\right)$ $\frac{1}{2}$

c.) {(THHH)(TTHH)(THHT)} $\left(\frac{3}{16}\right)$

2.) a.) $\frac{1}{n}$

b.) $\frac{1}{n} + \frac{1}{n}$

c.) $1/n_2$

4.) a.) 15

b.) [redacted] $= \frac{2}{15}$

5.) a.) $\binom{13}{1}\binom{4}{3}\binom{12}{1}\binom{4}{2}$

b.) $\binom{13}{1}\binom{4}{3}\binom{12}{2}\binom{4}{1}^2$

9.2

1.) a.) $\frac{n-1}{n}$

b.) $\frac{2}{n}$

c.) $n - \frac{1}{n}$

Homework

9.2 + 9.3

2.) a.) $\frac{1}{n}$ or $\frac{1}{n}$

b.) $\frac{1}{n}$ or $\frac{1}{n}$

c.) $n - \frac{1}{n}$

d.) $\frac{2}{n}$ or $\frac{2}{n}$

5 a.) $10 \cdot \left(\frac{1}{26} \text{ or } \frac{1}{26} \text{ or } \frac{1}{10}\right)$

9.3

1.) $P(A) = \frac{18}{36} = \frac{1}{2}$
$P(B) = \frac{8}{36} = \frac{2}{9}$
$P(C) = \frac{1}{6}$

b.) $\left(\frac{1}{2} \cap \frac{1}{6}\right) \div \frac{1}{6}$

c.) $\left(\frac{2}{9} \cap \frac{1}{6}\right) \div \frac{1}{6}$

d.) $\left(\frac{1}{2} \cap \frac{8}{9}\right) \div \frac{2}{9}$

e.) C since it only includes 1 dye.

3.) a.) $\frac{7}{64}$

b.) $\frac{1}{8}$

c.) $\left(\frac{7}{64} \cdot \frac{1}{8}\right) \div \frac{1}{8} = \frac{7}{64}$
$\left(\frac{57}{64} \cdot \frac{1}{8}\right) \div \frac{1}{8} = \frac{57}{64}$

$\frac{7}{64} + \frac{57}{64} = \frac{64}{64} = 1$

Therefore they are Complements.

This shows $p(E \cap F) = p(E) \cdot p(F)$. Independent

Homework

9.3 + 9.4 + 9.5

6.) a.) $(1/3)^{10}$

b.) $(1/3)^5 (2/3)^5$

6.4

1.) a.) Fair = $\frac{1}{2}$

Biased = $\frac{3}{4} \cdot \frac{1}{4} = \frac{3}{16}$

$\Rightarrow \frac{1/4}{\frac{11}{32}} \Rightarrow \frac{8}{11}$

$\frac{(1/2)(1/2)}{(1/2)(1/2)+(3/16)(1/2)}$

3.) a.) Fair = $\frac{3}{100}$

Biased = $\frac{2}{100} \cdot \frac{4}{100} = \frac{6}{10,000}$

$\Rightarrow \frac{(3/200)}{\left(\frac{153}{10,000}\right)} = \frac{50}{51}$

$\frac{(3/100)(1/2)}{(3/100)(1/2)+(4/10,000)(1/2)}$

4.) a.) Fair = $1/10000$

Biased = ~~$\frac{2}{100}$~~ $\frac{2.5}{100}$

$\Rightarrow \frac{(1/20,000)}{(251/20000)} = \frac{1}{251}$

$\frac{(1/10000)(1/2)}{(1/10000)(1/2)+(2.5/100)(1/2)}$

9.5

1.) a.) {(1, 2, 3, 4, 5, 6, 8, 10, 12, 9, 15, 16, 18, 20, 24, 25, 30, 36}

b.) $2/36$

2.) a.) ~~{2, 3, 4, 5, 6, 7, 8, 9, 10, J, Q, K, A}~~ (Ace - Spades, Hearts, Diamonds, Clubs)

b.) $4/52$

Homework

9.5 + 9.6

3.) a.) (1, 2, 3, 4, 5, 6, 7)

b.) 2 Girls are picked 7/15
1 Girl is picked 7/15
0 Girls are picked 3/15

5.) a.) (10, 8, 6, 4, 2, 0, -2, -4, -6, -8, -10)

b.) X is positive = 5/11
X is negative = 5/11

9.6

1.) a.) $E[G] = 2 \cdot (P(R=2)) + 1 \cdot P(R=1) + 0 \cdot P(R=0)$
$2 \cdot 7/15 + 1 \cdot 7/15 + 0$
$14/15 + 7/15 = 21/15$

2.) $2 \cdot (1/6) + 1 \cdot (1/6) + (-1) \cdot (4/6)$
$2/6 + 1/6 - 4/6 \Rightarrow -1/6$ or $-0.16

4.) a.) $6 \cdot (1/6) + 5 \cdot (1/6) + 4 \cdot (1/6) + 3 \cdot (1/6) + 2 \cdot (1/6) + 1 \cdot (1/6)$
$1 + 5/6 + 4/6 + 3/6 + 2/6 + 1/6$
$1 + 15/6 = 3 + 1/2$

b.) $(1/8) + 2 \cdot (3/8) + 1 \cdot (3/8)$
$3/8 + 6/8 + 3/8 = 12/8$

Homework

9.7 + 9.8

2.) $E[F] = 5 \cdot (p(E)) \Rightarrow 5 \cdot (7/40) \Rightarrow 35/40 \Rightarrow 7/8$

4.) $C = 1 \quad E[F] = 1 \cdot (1/10) \Rightarrow 1/10$

9.8

1.) a.) $(1/100) \cdot (1/100) = 1/10000$

b.) $\binom{100}{1} \cdot \binom{100}{1}$

c.) 1 since it is 1% of 100.

d.) 1/50, increases odds of good board since there are only 50 chances instead of 100.

3.) a.) This means coin is fair, but number of heads is less than 4.
Which means $3/10$.

b.) coin is biased, number of heads is at least 4. $= 0.3 \cdot 6/10 = 0.18$