P(H) P(T)
P(H) P(H)

1. 3 Balls ; 3 bowls ; Y = # empty bowls
   2 empty Bowls : 1 way ∴
   1 empty bowl : 6 ways ∴|∴ ×3 permutations
   0 empty bowls : 1 way ∴

   $Y = 2$: $1/8 = 0.125$
   $Y = 1$: $6/8 = 0.75$
   $Y = 0$: $1/8 = 0.125$

2. 7 TVs : 2 defective 5 good
   Choose 3 ; X = # defective

   0 defective : $5 \cdot 4 \cdot 3 = 60$ $P(X=0) : \frac{60}{110} = 0.54$
   1 defective : $5 \cdot 4 \cdot 2 = 40$ $P(X=1) : 40/110 = 0.36$
   2 defective : $5 \cdot 2 \cdot 1 = 10$ $P(X=2) : 10/110 = 0.09$
   3 defective : 0 $P(X=3) : 0/110 = 0$

3. W = # heads − # tails in 3 coin tosses

   a. S = {HHH ⇒ w = 3
   HHT ⇒ w = 1
   HTH ⇒ w = 1
   HTT ⇒ w = −1
   THH ⇒ w = 1
   THT ⇒ w = −1
   TTH ⇒ w = −1
   TTT ⇒ w = −3}

   $w \in \{3, 1, -1, -3\}$

   b. $P(w=3) = 1/8 = 0.125$
   $P(w=1) = 3/8 = 0.375$
   $P(w=-1) = 3/8 = 0.375$
   $P(w=-3) = 1/8 = 0.125$

   c. $E(w) = \frac{1}{8}(3) + \frac{3}{8}(1) + \frac{3}{8}(-1) + \frac{1}{8}(-3) = 0$
   $Var(w) = \frac{1}{8}(3)^2 + \frac{3}{8}(1)^2 + \frac{3}{8}(-1)^2 + \frac{1}{8}(-3)^2 = 3$

4.

x	−3	6	9
P	1/6	1/2	1/3

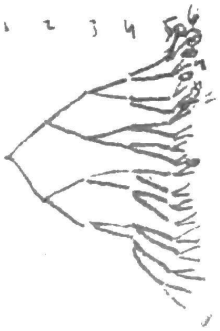
   a. $E(x) = \frac{1}{6}(-3) + \frac{1}{2}(6) + \frac{1}{3}(9) = 5.5$
   $E(x^2) = \frac{1}{6}(-3)^2 + \frac{1}{2}(6)^2 + \frac{1}{3}(9)^2 = 46.5$
   b. $Var(x) = \frac{1}{6}(-3-5.5)^2 + \frac{1}{2}(6-5.5)^2 + \frac{1}{3}(9-5.5)^2 = 16.25$
   c. $E(gain) = \frac{1}{6}(2(-3)+1)^2 + \frac{1}{2}(2(6)+1)^2 + \frac{1}{3}(2(9)+1)^2 = 242$

4 5 8 4 5 4 3 2 5 4 3 2

5. X: green die Y: red die

a. $\mu = \frac{1}{6 \cdot 6} \sum_{x=1}^{6} \sum_{y=1}^{6} 2x - y = 3.5$

$\text{Var}(2x-y) = \frac{1}{6 \cdot 6} \sum_{x=1}^{6} \sum_{y=1}^{6} (2x - y - \mu)^2 = \frac{525}{36} = 14.58\overline{3}$



b. $\mu = \frac{1}{6 \cdot 6} \sum_{x=1}^{6} \sum_{y=1}^{6} x + 3y - 5 = \frac{324}{36} = 9$

$\sigma^2 = \frac{1}{66} \sum_{x=1}^{6} \sum_{y=1}^{6} (x + 3y - 5 - 9)^2 = \frac{1050}{36} = 29.1\overline{6}$

6. 50% companies $P(A) = 0.5$

a. $P(X \in [2,5]) = \frac{15+20+15+6}{64} = 0.875$

b. $P(X < 3) = \frac{1+6+15}{64} = 0.34375$

$P(X=0) = \binom{6}{0}\left(\frac{1}{2}\right)^6 = 1/64$

$P(X=1) = \binom{6}{1}\left(\frac{1}{2}\right)^6 = 6/64$

$P(X=2) = \binom{6}{2}\left(\frac{1}{2}\right)^6 = 15/64$

$P(X=3) = \binom{6}{3}\left(\frac{1}{2}\right)^6 = 20/64$

$P(X=4) = \binom{6}{4}\left(\frac{1}{2}\right)^6 = 15/64$

$P(X=5) = \binom{6}{5}\left(\frac{1}{2}\right)^6 = 6/64$

$P(X=6) = \binom{6}{6}\left(\frac{1}{2}\right)^6 = 1/64$

7. $P(A) = 0.6$ X = # contracting

a. $P(X=0) = (0.6)^5 = 0.07776$

b. $P(X<2) = 0.07776 + 0.2592 = 0.33696$

c. $P(X>3) = 0.0512 + 0.0768 = 0.128$

$P(X=0) = \binom{5}{0}(0.4)^5 = 0.07776$

$P(X=1) = \binom{5}{1}(0.6)^1(0.4)^4 = 0.2592$

$P(X=2) = \binom{5}{2}(0.6)^2(0.4)^3 = 0.3456$

$P(X=3) = \binom{5}{3}(0.6)^3(0.4)^2 = 0.2304$

$P(X=4) = \binom{5}{4}(0.6)^4(0.4)^1 = 0.0768$

$P(X=5) = \binom{5}{5}(0.4)^5 = 0.0512$

8. $P(A) = 0.7$ X = # tries (A) poss

a. $P(X=3) = (1-0.7)^2(0.7) = 0.063$

b. $\sum_{i=0}^{3} (1-0.7)^i (0.7) = 0.9capped$

9. $P(A) = 0.1$

a. $P(X=2) = (0.9)(0.1) = 0.09$

b. $P(X=5, B=3) = \binom{4}{2}(0.9)^2(0.1)^2(0.1) = 0.00486$

10. $P(B) = 0.8$

a. $P(X=6, B=4) = \binom{5}{3}(0.8)^3(0.2)^2(0.8) = 0.164$

b. ~~$P(B=4)$~~ $(0.2)^2(0.8) = 0.032$