3.30   52 - 20 = 32   32 card left

    a) $3/32 \cdot 1/3 + 0 = 1/32$.   ← wrong answer key..?

    b) $0 + 1/32 = 1/32$.

           ↑   ↗ if two of clubs are not selected already

If two of clubs already selected

3.32   a) $1/2 \times 1/2 + 1/2 \times 2/3 = 1/4 + 1/3 = 7/12$

    b) $P(X|Y) = P(X \wedge Y) / P(Y)$

      $P(Y) = 5/12$

      $P(X \wedge Y) = 1/2 \times 1/2 = 1/4$

      $P(X|Y) = 1/4 \times 12/5 = 3/5$

3.35   a) $0.7 \times 0.7 + 0.3 \times 0.9$

      $= 0.49 + 0.27 = 0.76$

    b) $P(\text{rain} | \text{early}) = P(\text{rain} \wedge \text{early}) / P(\text{early})$

               $= (0.7 \times 0.7) / 0.76$

               $= 0.49 / 0.76 = 49/76$

3.37   a) $0.6 \cdot 0.7 + 0.4 \cdot 0.5 = 0.42 + 0.2 = 0.62$

    b) $P(\text{dad} | \text{downstairs}) = P(\text{dad} \wedge \text{downstairs}) / P(\text{downstairs})$

      $(0.4 \cdot 0.5) / (0.6 \cdot 0.3 + 0.4 \cdot 0.5)$ $0.18 + 0.2 = 0.38$

      $= 0.2 / 0.38$

      $= 10/19$

3.38 $(0.7 \cdot 100/225) / 0.5 \cdot 50/225 + 0.6 \cdot 75/225 + 0.7 \cdot 100/225$
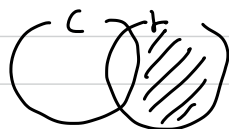
    $= 1/2$

3.44 $P(\text{Cali}) = 0.12$

    $P(\text{rich}) = 0.013$ $P(\text{rich} | \text{Cali}) = 0.033 = P(\text{rich} \wedge \text{Cali}) / P(\text{Cali})$

    a) $P(\text{rich} | \text{Cali}^c)$ $P(\text{rich} \wedge \text{Cali}) = 0.033 \cdot 0.12$

     $= P(\text{rich} \wedge \text{Cali}^c) / P(\text{Cali}^c)$ $= 0.00396$

                       $0.013 - 0.00396$

                       $= 0.00904$

    $= 0.00904 / 0.88$

    $= 0.01027$ ∴ 1.027% ← Answer key is wrong ?

    b) $P(\text{Cali} | \text{rich}) = P(\text{Cali} \wedge \text{rich}) / P(\text{rich})$

             $= 0.00396 / 0.013 = 0.3046$ ∴ 30.46%

3.45 $P(\text{two-head} | \text{head}) = P(\text{two-head} \wedge \text{head}) / P(\text{head})$

           $= (1/3 \cdot 1) / (1/3 \cdot 1 + 1/3 \cdot 1/2 + 1/3 \cdot 3/4)$

           $= (1/3) / (3/4)$

             $= 4/9$

3.48 a) $P(\text{all white}) = \frac{1}{6} \cdot {}_5C_1/{}_{15}C_1 + \frac{1}{6} \cdot {}_5C_2/{}_{15}C_2 + \frac{1}{6} \cdot {}_5C_3/{}_{15}C_3$
$$+ \frac{1}{6} \cdot {}_5C_4/{}_{15}C_4 + \frac{1}{6} \cdot {}_5C_5/{}_{15}C_5$$

b) $P(\text{die } 3 \mid \text{all white}) = (\frac{1}{6} \cdot {}_5C_3/{}_{15}C_3) / \frac{1}{6} \cdot {}_5C_1/{}_{15}C_1 + \frac{1}{6} \cdot {}_5C_2/{}_{15}C_2 + \cdots$

3.51 a) $0.268 \cdot 0.10 / 0.268 \cdot 0.7 + 0.135 \cdot 0.3$
$$= 0.822 \rightarrow 82.2\%$$

b) $0.732 \cdot 0.7 / 0.7718 = 0.664 \rightarrow 66.4\%$

3.52 a) $0.05 \cdot 0.2 + 0.15 \cdot 0.5 + 0.3 \cdot 0.3 = 0.175$

b) $0.95 \cdot 0.2 / 0.825$

c) $0.85 \cdot 0.5 / 0.825$

3.53 a) $0.8 \cdot 0.7 + 0.4 + 0.2 + 0.1 \cdot 0.1 = 0.65$

b) $0.56 / 0.65 = 56/65$
    moderate $\rightarrow 8/65$
    weak $\rightarrow 1/65$

c) $0.2 \cdot 0.7 / 0.35 = 14/35$
    moderate $\rightarrow 12/35$
    weak $\rightarrow 9/35$

3.58 ▢ ▢ ▢ $\cdots$ n
$(\frac{1}{2})^n$
$P(C_1 \text{ work} \mid \text{function}) = P(C_1 \text{ work} \wedge \text{function}) / P(\text{function})$
$P(C_1 \wedge f) = \frac{1}{2}$ $P(\text{function}) = 1 - P(\text{all off})$
$$= 1 - (\frac{1}{2})^n$$
$$= 2^n - 1 / 2^n$$
$(\frac{1}{2}) / ((2^n - 1)/2^n) = 2^n / 2(2^n - 1)$

3.62 a) $2P(1-P)$
b) $3P^2(1-P)$
c) $2P^2(1-P) / 3P^2(1-P) = \frac{2}{3}$

3.76 a) $1/16$ b) $1/32$ c) $10/32$ d) $1/4$ e) $31/32$

3.77 Sum 8 $\rightarrow (3,6)(4,5)(5,4)(6,3)$ $4/36 = 1/9$
   Sum 6 $\rightarrow (1,5)(2,4)(3,3)(4,2)(5,1)$ $5/36$
    $P_A = 1/9 + 8/9 \cdot 31/36 \cdot P_A$
     $P_A = 9/19$