HW 4 SOLUTIONS

55 (a) \( P(\text{up-down or down-up}) = 2p(1-p) \)

(b) \( P(2\text{ up and 1 down}) = 3p^2(1-p) \)

(c) \( 2p^2(1-p)/3p^2(1-p) = 2/3 \)

64 (a) \( P(\text{correct}) = p \), (b) \( P(\text{correct}) = p^2 + \frac{1}{2} \cdot 2p(1-p) = p \)

66 (a) \( P(\text{5 conduct and 142 both conduct or 384 both conduct}) = \)

\[ P_5 \left[ 1 - P(1/2 \text{ do not both conduct}) P(3/4 \text{ do not both conduct}) \right] \]

\[ = P_5 \left[ 1 - \left( 1 - \frac{1}{2} \cdot \frac{1}{2} \cdot \frac{1}{2} \cdot \frac{1}{2} \right) \left( 1 - \frac{3}{4} \cdot \frac{3}{4} \cdot \frac{3}{4} \cdot \frac{3}{4} \right) \right] \]

73 (a) \( \frac{1}{4} \cdot \frac{1}{2} \cdot \frac{1}{2} \cdot \frac{1}{2} \cdot \frac{1}{2} \), (b) \( \frac{5}{12} \cdot \frac{1}{2} \), (c) \( \frac{5}{12} \cdot \frac{1}{2} \), (d) \( \frac{1}{2} \), (e) \( \frac{1}{2} \)

74 Call a win by A followed by a win by B a step.

\( P(\text{A final}) = P(\text{A final | win at step n, step n+1}) \)

\[ = \frac{\frac{4}{36}}{\frac{4}{36} + \frac{32}{36} \cdot \frac{5}{36}} = \frac{3}{19} \]

84 (a) \( P(\text{A wins}) = P(\text{A wins | game decided in 1st round}) \)

\[ = \frac{\frac{5}{12} \cdot \frac{4}{12}}{\text{(same deno.)}} \]

\( P(\text{B wins}) = \frac{\frac{5}{12} \cdot \frac{4}{12}}{\text{(same deno.)}} \)

\( P(\text{C wins}) = \frac{\frac{5}{12} \cdot \frac{4}{12}}{\text{(same deno.)}} \)

(b) \( P(\text{A wins}) = P(\text{A wins in 1st round}) + P(\text{A wins in 2nd round}) \)

\[ + P(\text{A wins in 3rd round}) \]

\[ = \frac{4}{12} + \frac{8}{12} \cdot \frac{7}{11} + \frac{6}{10} \cdot \frac{4}{9} + \frac{8}{12} \cdot \frac{1}{10} \cdot \frac{5}{8} + \frac{4}{12} \cdot \frac{3}{8} \cdot \frac{4}{6} \]

(Similar for others.)