Homework 0

(1)   (b), (f), (h), (i)

(2)   The different possible combinations of rolling two dice are (1) 1 + 1, (2) 1 + 2, (3) 1 + 3, (4) 1 + 4, (5) 1 + 5, (6) 1 + 6, (7) 2 + 1, (8) 2 + 2, (9) 2 + 3, (10) 2 + 4, (11) 2 + 5, (12) 2 + 6, (13) 3 + 1, (14) 3 + 2, (15) 3 + 3, (16) 3 + 4, (17) 3 + 5, (18) 3 + 6, (19) 4 + 1, (20) 4 + 2, (21) 4 + 3, (22) 4 + 4, (23) 4 + 5, (24) 4 + 6, (25) 5 + 1, (26) 5 + 2, (27) 5 + 3, (28) 5 + 4, (29) 5 + 5, (30) 5 + 6, (31) 6 + 1, (32) 6 + 2, (33) 6 + 3, (34) 6 + 4, (35) 6 + 5, (36) 6 + 6. There are six combinations that result in a sum of seven, so the probability is $p = \frac{6}{36} = \frac{1}{6} \approx 0.167$.

(3)   (a)   The sample space includes the following scenarios: (1) 0 red, 0 blue, 3 green; (2) 0 red, 1 blue, 2 green; (3) 0 red, 2 blue, 1 green; (4) 1 red, 0 blue, 2 green; (5) 1 red, 1 blue, 1 green; (6) 1 red, 2 blue, 0 green.

        (b)   An example of a simple event would be "What is the probability that at least one green ball is chosen from the bag." The probability of that simple event would be $p = \frac{5}{6} \approx 0.833$.

(4)   (a) $P(A|C) = \frac{P(A \cap C)}{P(C)} = \frac{\frac{5}{36}}{\frac{27}{36}} = \frac{5}{27} \approx 0.185$.

        (b) $P(B|C) = \frac{P(B \cap C)}{P(C)} = \frac{\frac{21}{36}}{\frac{27}{36}} = \frac{21}{27} \approx 0.778$.

        (c) $P(A) * P(C) = \frac{5}{36} * \frac{27}{36} = \frac{135}{1296} \approx 0.104 \neq 0.139 = \frac{5}{36} = P(A \cap C)$. Therefore, A and C are not independent.

(5)   (a) $P(W) = P(W \cap B) + P(W \cap L) + P(W \cap U) + P(W \cap D)$.

        (b) $P(W) = P(W|B) * P(B) + P(W|L) * P(L) + P(W|U) * P(U) + P(W|D) * P(D)$.

(6) $p = \frac{1}{7} * \frac{2}{7} = \frac{2}{49} \approx 0.041$.

(7) $p = 1 - 0.6826 = 0.3174 = 31.74\%$.

(8)   (a) $P(D|John) = \frac{\frac{100}{300} * \frac{20}{47}}{\left(\frac{100}{300} * \frac{20}{47}\right) + \left(\frac{60}{300} * \frac{6}{47}\right) + \left(\frac{140}{300} * \frac{21}{47}\right)} \approx 0.377$.

        (b) $P(D|John) = \frac{\frac{100}{300} * 0.20}{\left(\frac{100}{300} * 0.20\right) + \left(\frac{60}{300} * 0.15\right) + \left(\frac{140}{300} * 0.10\right)} \approx 0.465$.

(9) $P(ML|AI) = \frac{P(ML \cap AI)}{P(AI)} = \frac{0.45}{0.55} \approx 0.818$.

(10) $p = \frac{5}{10} * \frac{5}{10} * \frac{2}{10} * \frac{2}{10} = \frac{100}{10000} = 0.01$.