HOMEWORK ASSIGNMENT 1

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(1) Problem A

(a) P(first arrival at 4-min) = P(no 3-min *and* 1 or more 4-min)
$= P$(no 3-min) P(1 or more 4-min | no 3-min) (2.7)
$= 0.5^3 \times (1 - P$(no 4-min | no 3-min))
$= 0.5^3 \times (1 - 0.5^3)$
$= 7/64$

(b) $P(C_1 + C_2 + C_3 = 10)$
$= P(3,3,4) + P(3,4,3) + P(4,3,3)$
$= P(C_1 = 3)P(C_2 = 3)P(C_3 = 4) \times 3$
$= 0.5 \times 0.5 \times 0.25 \times 3$
$= 1/16$

(c) P(all 3-min | all same)
$= P$(all 3-min and all same) $/P$(all same) (2.7)
$= 0.5^3/(0.5^3 + 0.25^3 + 0.25^3)$
$= 0.8$

(2) Problem B

$P(A_2 >= 1|2$ attempts)
$P(2$ attempts)
$= P(A_1 = 0$ and $A_2 = 2$ or $A_1 = 1$ and $A_2 = 1$ or $A_1 = 2$ and $A_2 = 0)$
$= P(A_1 = 0$ and $A_2 = 2) + (A_1 = 1$ and $A_2 = 1) + (A_1 = 2$ and $A_2 = 0))$ (2.2)
$= P(A_1 = 0)P(A_2 = 2|A_1 = 0) + P(A_1 = 1)P(A_2 = 1|A_1 = 1) + P(A_2 = 0|A_1 = 2))$ (2.7)
$= (1-p)^2 \times p^2 + (p \times (1-p))(q \times p(1-p) + (q \times (1-p)(p)) + ((1-p) \times p) + (1-p)^2 \times p^2$

$P(A_2 >= 1$and 2 attempts) / $P(2$ attempts)
$= P(A_1 = 0)P(A_2 = 2|A_1 = 0) + P(A_1 = 1)P(A_2 = 1|A_1 = 1)/P(A_1 = 0)P(A_2 = 2|A_1 = 0) + P(A_1 = 1)P(A_2 = 1|A_1 = 1) + P(A_2 = 0|A_1 = 2))$
$= (1-p)^2 \times p^2 + (p \times (1-p))(q \times p(1-p) + (q \times (1-p)(p)) + ((1-p) \times p)/(1-p)^2 \times p^2 + (p \times (1-p))(q \times p(1-p) + (q \times (1-p)(p)) + ((1-p) \times p) + (1-p)^2 \times p^2$

(3) See code.