MATH203 A2

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Q3.34

let NB = navy blue sock

let B = black sock

let r and l = right and left sock

the probability for the first pick at random = 0.25 (out of 4 socks)

the probability of the secon pick at random = 0.333 (out of 3 socks)

0.25*0.333 = 0.0833

given four socks, 4*0.0833 = 0.3333

therefore the chance of getting 50% right match is not true. It's less.

Q3.62

a. the probability that the cell phone is using color code 5 is 85/160 = 0.53125

b. the probability that the cell phone is using color code 5 or color code 0 is 35/160 + 85/160 = 0.21875 + 0.53125 = 0.75

c. the probabiliy that the cell phone used is Model 2 and the color code is 0 is 75/160 * 35/160 = 0.46875 * 0.21875 = 0.10254

Q3.66

the only way to prove it is to print out all the possible permutations for 9 and 10 and compare.

Nine: 621 612 531 522 513 441 432 423 414 351 342 333 324 315 261 252 243 234 225 216 162 153 144 135 126 —– P(9) = 25/216

Ten: 631 622 613 541 532 523 514 451 442 433 424 415 361 352 343 334 325 316 262 253 244 235 226 163 154 145 136 —– P(10) = 27/216

therefore P(9) is less than P(10).

Q3.90

a. Given the previous sleep stage was the Wake state, the probability that the current sleep stage is REM is 1733/7987 = 0.21708

b. Given the current sleep stage is REM, the probability that the previous sleep stage was not the Wake state is (7609 + 346) / (7609 + 346 + 175) = 0.97847

c. The evebts {previous stage is REM} and {current stage is REM} are NOT mutually exclusive.

d. The events {previous stage is REM} and {current stage is REM} are NOT independent.

e. The events {previous stage is Wake} and {current stage is Wake} are NOT independent.

Q3.100

a. Let n = normal cell and m = mutant cell. The possible pedigress are: nn, nm, mn, and mm.

b. Assume each "daughter cell" is equally likely to be normal or mutant, then P(n) = P(m) = 0.5

from part a we know that the probability of possible pedigrees listed is 0.5 * 0.5 = 0.25.

The probability that a single, normal cell that divides into two offspring will result in a least one mutant cell is P(nm) + P(mn) + P(mm) = 0.25 + 0.25 + 0.25 = 0.75

c. Assume P(m) = 0.25, we know P(n) = 1- 0.2 = 0.8.

The probability that a single normal cell that divides into two offspring will result at least one mutant cell is P(nm) + P(mn) + P(mm) = 0.8 * 0.2 + 0.2 * 0.8 + 0.2 * 0.2 = 0.36.

d. Since the first generation resulted in nn, there are 4 possible pedigrees, nn, nm, mn, and mm. Since there are 4 possible pedigrees for the first and second generation normal cell, there are 4 * 4 = 16 possible second generation pedigrees from nn. They are: nnnn nnnm nnmn nmnn mnnn nnmm nmnm nmmn mnnm mnmn mmnn nmmm mnmm mmnm mmmn mmmm

If the first generation resulted in nm, then the first generation cell has 4 possible pedigrees, nn, nm, mn, and mm. Since there are 4 possible pedigrees for the first genertion and 1 possible pedigrees for the second generation, there are 4 possible second generation pedigrees from a first generation nm. They are: nnmm nmmm mnmm mmmm

If the first generation resulted in mn, then the fist generation mutant cell has one possible pedigree, mn, since the first gneeration normal cell has 4 possible peigree. There are 4 possible second generation pedigrees from a first genration nm. They are: mmnn mmnm mmmn mmmm

If the first generation resulted in mm, there is one possible pedigree, mm. Therefore there is only one possible second generation pedigree from a fist generation mm. It is: mmmm.

e. Knowing that a "daughter" cell is equally likely to be mutant or normal. I can find the probability that a single, normal cell that divides into two offspring will result in at least one mutant cell after the second generation. By calculating 1 - P(nnnn) which is 1 - (1/4)(1/16) = 1 - 1/64 = 0.9844

Q.3.122

a. The number of possible ordering over the eight days is 8! = 40320

b. The probability that ESPN is selected on Monday, Jully 11th is 1/8.

c. The probability that MTV is selected on Sunday is 2/8=1/4 due to the fact there are two Sundays.

Q.3.144

P(defect #1) = 0.03

P(not defect #1) = 0.97

P(defect #2) = 0.05

P(not defect #2) = 0.95

P(defect #1, not defect #2) = 0.03 * 0.95 = 0.0285

P(defect #2, not defect #1) = 0.05 * 0.97 = 0.0485

P(defect #1, defect #2) = 0.03 * 0.05 = 0.0015

The probability that an actual defect exists when NDE detects a hit is P(defect and hit) = 1 - (0.97 * 0.95) = 0.0785

Q.3.146

Multiplicative rule

$$Pr(A \cap B) = Pr(A|B) \times Pr(B)$$

the probabiliy of event ‘ok’ occurs, given event ‘ok’ we know

$$Pr(A|B)$$

is 0.9 and we know

$$Pr(B)$$

is 0.8 then

$$Pr(A \cap B)$$

is 0.89

Q.3.184

a. sample space is 20, sample points for this experiment is 10.

b. two rules for the probabilities assigned to sample points: they must be between 0 and 1 inclusively; all probabilities assigned to sample points in the sample space must sum to 1. the probabilities to each of the sample points is

$$\frac{1}{2}$$

c. the probability that the psychlogist guesses all classifications correctly is

$$10/20 \times 9/19 \times 8/18 \times 7/17 \times 6/16 \times 5/15 \times 4/14 \times 3/13 \times 2/12 \times 1/11 = 1/184756$$

d. the probability that the psychologist guesses at least 9 of the 10 high-anxiety subjexts correctly is

$$10/20 \times 9/19 \times 8/18 \times 7/17 \times 6/16 \times 5/15 \times 4/14 \times 3/13 \times 2/12 = 1/16796$$

Q.3.188

The probability of of getting boys or girls is

$$P(Boy - BoyorGirl - Girl) = \frac{1085 + 926}{4208} = 0.478$$

That concludes there is no evidence that shows having boys or girls runs in the family due to the probability is less than 0.5.

Q.3.192

a. the probability that a player winsd the game on the first roll of the dice is

$$P(7) + P(11)$$

$$P(7) = 6/36 = 1/6, P(11) = 2/36 = 1/18$$
$$therefore 1/6 + 1/18 = 2/9$$

b. the probability that a player loses the game on the first roll of the dice is

$$P(2) + P(3)$$

$$P(2) = 1/36, P(3) = 2/36$$
$$therefore 1/36 + 2/36 = 1/12$$

c. if the player throws a total of 4 on the first roll, the probability that the game ends (win or lose) ob the next roll is

$$P(4) + P(7)$$
$$P(4) = 3/36, P(7) = 6/36$$
$$therefore 3/36 + 6/36 = 1/4$$

end of the assignment 2