PROBABILITY TEST - SGHS - 2003

1/ In a group of 50 students, there are 26 who study Latin and 15 who study Greek. Of these language students 8 take both languages. Draw a Venn diagram and find the probability that a student chosen at random

i) studies only Latin

ii) studies only Greek

iii) does not study either language

2/ A coin is weighted so that it is twice as likely to fall heads as it is tails;

i) write down the probabilities that the coin falls
A) heads B) tails

ii) if the coin is tossed 3 times, what is the probability of throwing head,tail,head in that order.

3/ Li-Lin buys five tickets in a raffle in which 20 tickets are sold. Three different tickets are to be drawn out for first, second, and third prizes. Draw a tree diagram and find the probability that;

i) she wins all three prizes

ii) she does not win a prize

iii) she wins at least one prize

iv) she wins exactly one prize

Q4// In a certain country town the probability of an adult catching a cold during 2003 is 0.2. Two adults in the town are selected at random.

(i) Draw a tree diagram to illustrate the possible outcomes (include probabilities in your diagram).

(ii) What is the probability that both chosen adults will catch colds during 2003?

(iii) What is the probability that neither of the chosen adults will catch colds during 2003?

Q5// In a certain school there are two senior French classes, classes A and B. Class A contains 11 female students and 9 male students. Class B contains 8 female students and 12 male students. One student is selected at random from each class.

What is the probability:

(i) both students are female

(ii) both students are male

(iii) one student is male and one is female

6

Barry, Robin and Maurice are singers in a band. At any given concert the probability that Barry will sing first is 50%, whilst there is a 30% chance that Robin will sing first and there is a 20% chance it will be Maurice who sings first. The group holds three concerts. What is the probability:

(i) Barry sings first at all three concerts.
(ii) Maurice will sing first at least once during the three concerts.
(iii) Robin will not sing first at any of the three concerts.

Q7

Terry owns a pair of dice. One die is unbiased but the second die is biased so that the even numbers are twice as probable as the odd numbers. If the two dice are rolled and the uppermost face scores are added together, what is the probability the total tossed is:

(i) a total of 2

(ii) a total of 12

Q8

A man has four pairs of socks, each pair a different colour. If he selects two socks at random, what is the probability that they form a matching pair?

Q9 Given any Mathematics problem, Mary has a 90% success rate, Leanne an 80% success rate and Hayley a 75% success rate. The girls are given a problem. What is the probability ;

i) Only Mary solves the problem

ii) All three solve the problem

iii) None of the students solve the problem

iv) Only one of the students solves the problem

Q10 Monica is a tennis player. To win a tennis match against Anna she must win two out of three sets.

In the first set Monica has an equal chance of winning. If she wins a set her chance of winning the next set increases to 0.6 If she loses a set her chance of winning the next set decreases to 0.3 (Hint: Draw a tree diagram).

(i) What is the probability Monica wins the first two sets?

(ii) What is the probability Monica loses the first two sets?

(iii) What is the probability the match will require three sets for a result?

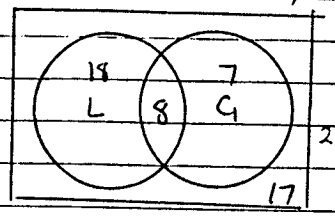
(iv) What is the probability Monica will win the match at the end of three sets?

(v) What is the probability Monica will win the match?

Need to show working

Probability Test Yr 11 Solns

Q1



50 − 33

i) $P(L) = \frac{18}{50}$ # 2 $= \frac{9}{25}$ # 2

ii) $P(C) = \frac{7}{50}$ # 2

iii) $P(\overline{L} \cap \overline{C}) = \frac{17}{50}$ # 2

(6)

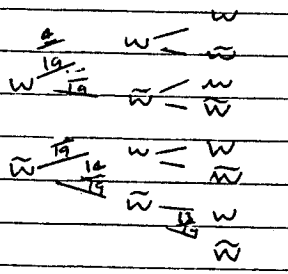
Q2 S. Space $\{H, H, T\}$ i) A) $\frac{2}{3}$ # 2 B) $\frac{1}{3}$ # 2

ii) $P(HTH) = \frac{2}{3} \times \frac{1}{3} \times \frac{2}{3}$

$= \frac{4}{27}$ # 2

(6)

Q3



i) $P(WWW) = \frac{5}{20} \times \frac{4}{19} \times \frac{3}{18}$

$= \frac{60}{6840} = \frac{1}{114}$ #

ii) $P(\overline{W}\,\overline{W}\,\overline{W}) = \frac{15}{20} \times \frac{14}{19} \times \frac{13}{18}$

$= \frac{2730}{6840}$

$= \frac{91}{228}$ #

iii) $P(\text{win at least one prize}) = 1 - P(\overline{W}\,\overline{W}\,\overline{W})$

$= 1 - \frac{91}{228}$

$= \frac{137}{228}$ #

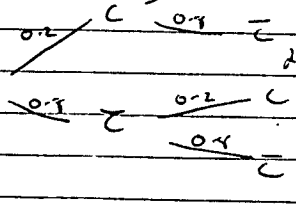
iv) $P(W\overline{W}\overline{W}) + P(\overline{W}W\overline{W}) + P(\overline{W}\overline{W}W)$

$= \frac{5}{20} \times \frac{15}{19} \times \frac{14}{18} + P(\frac{15}{20} \times \frac{5}{19} \times \frac{14}{18}) + P(\frac{15}{20} \times \frac{14}{19} \times \frac{5}{18})$

$= \frac{3150}{6840} = \frac{35}{76}$ #

Q4

i)



ii) $P(CC) = 0.2 \times 0.2$

$= 0.04$ $(\frac{1}{25})$

2

iii) $P(\overline{C}\,\overline{C}) = 0.8 \times 0.8$

$= 0.64$ $(\frac{16}{25})$

2

(6)

Q5 i) $P(FF) = \frac{11}{20} \times \frac{5}{20}$

$= \frac{11}{80}$ #

ii) $P(mm) = \frac{9}{20} \times \frac{12}{20}$

$= \frac{27}{100}$ #

iii) $P(mF) + P(Fm)$

$= \frac{9}{20} \times \frac{5}{20} + \frac{11}{20} \times \frac{12}{20}$

$= \frac{51}{100}$ #

Q6 i) $P(BBB) = \frac{50}{100} \times \frac{50}{100} \times \frac{50}{100}$

$= \frac{1}{8}$ #

ii) $1 - P(\overline{m}\,\overline{m}\,\overline{m})$

$= 1 - (\frac{3}{5})^3$

$= \frac{61}{125} = 0.488$ #

iii) $P(\overline{R}\,\overline{R}\,\overline{R}) = 0.7 \times 0.7 \times 0.7$

$= 0.343$

$= \frac{343}{1000}$ #

OR $P(BBB) + P(mmm) + P(BBm) + P(mmB) + P(BmB) + P(mBm) + P(Bmm) + P(mBB)$

Q7 i) $P(1,1) = \frac{1}{6} \times \frac{1}{6}$

$= \frac{1}{36}$ #

ii) $P(6,6) = \frac{1}{6} \times \frac{2}{9}$

$= \frac{2}{54}$ #

S Space $(1,1)\ (1,2)\ (1,3)\ (1,4)\ (1,5)\ (1,6)\ (2,1)\ (2,2)\ (2,3)\ (2,4)\ (2,5)\ (2,6)$

Q8 $P = 1 \times \frac{1}{7}$

$= \frac{1}{7}$ #

Q9 i) $P(\text{red}) = \frac{90}{100} \times \frac{20}{100} \times \frac{25}{100}$

$= \frac{9}{200}$ #

ii) $P(m \cap H) = \frac{90}{100} \times \frac{50}{100} \times \frac{27}{100}$

$= \frac{27}{50}$ #

iii) $P(\overline{m} \cap \overline{H}) = \frac{10}{100} \times \frac{20}{100} \times \frac{25}{100}$

$= \frac{1}{200}$ #

iv) $P(m\overline{H}\overline{H}) + P(\overline{m}H\overline{H}) + P(\overline{m}\overline{H}H)$

$= (\frac{9}{10} \times \frac{2}{10} \times \frac{1}{4}) + (\frac{1}{10} \times \frac{8}{10} \times \frac{1}{4}) + (\frac{1}{10} \times \frac{2}{10} \times \frac{3}{4})$

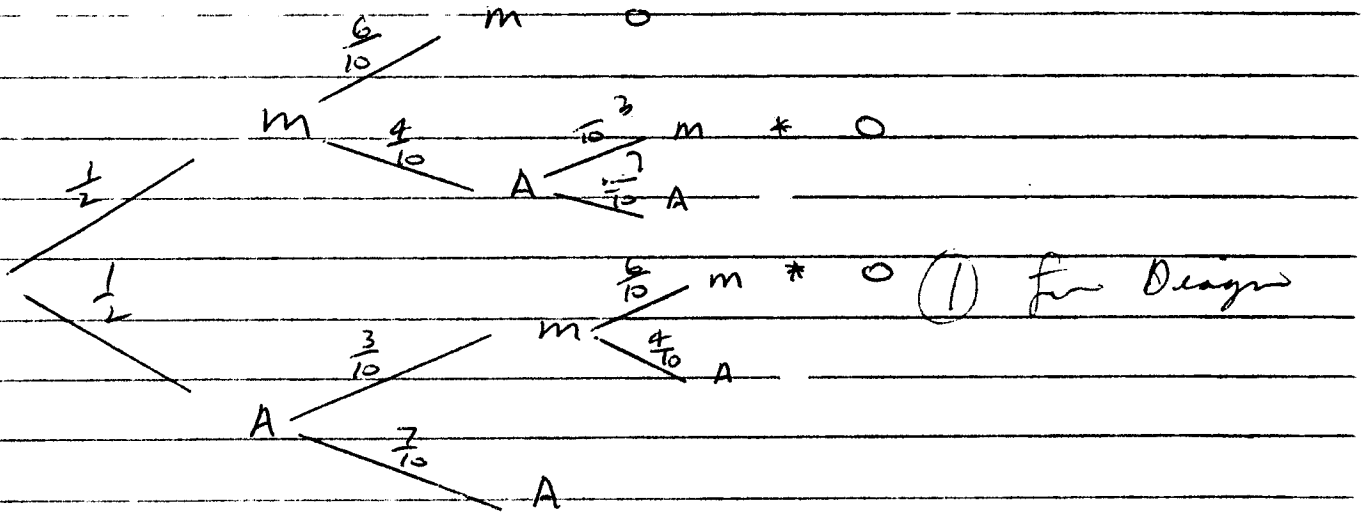
$= \frac{18}{400} + \frac{8}{400} + \frac{6}{400}$

$= \frac{32}{400}$

$= \frac{2}{25}$ #

① ②

Q10 ....



(1) For Diagram

i) $P(mm) = \frac{1}{2} \times \frac{6}{10}$
$= \frac{3}{10}$ 出

ii) $P(AA) = \frac{1}{2} \times \frac{7}{10}$
$= \frac{7}{20}$ 出

iii) $1 - P(mm \text{ or } AA) = 1 - \left(\frac{3}{10} + \frac{7}{20}\right)$
$= \frac{7}{20}$ 出

iv) $P(mAm) + P$ . . . . . $+ P(Amm) +$ . . . . .
$= \left(\frac{1}{2} \times \frac{4}{10} \times \frac{3}{10}\right) +$ . . . . . $+ \left(\frac{1}{2} \times \frac{3}{10} \times \frac{6}{10}\right) +$ . . . . .
$= \frac{12}{200} +$ $+ \frac{18}{100} +$
$= \frac{30}{200} = \frac{15}{100}$ 出 P5

v) $P(mm) + P(mAm) + P(Amm)$
$= \left(\frac{1}{2} \times \frac{6}{10}\right) + \left(\frac{1}{2} \times \frac{4}{10} \times \frac{3}{10}\right) + P\left(\frac{1}{2} \times \frac{3}{10} \times \frac{6}{10}\right)$
$= \frac{3}{5} + \frac{12}{200} + \frac{18}{100}$ 出 q5
$= \frac{45}{100}$