1. Evan likes to play two games of chance, A and B.

For game A, the probability that Evan wins is 0.9. He plays game A seven times.

(a) Find the probability that he wins exactly four games.

(2)

For game B, the probability that Evan wins is *p*. He plays game B seven times.

(b) Write down an expression, in terms of *p*, for the probability that he wins exactly four games.

(2)

(c) Hence, find the values of *p* such that the probability that he wins exactly four games is 0.15.

(3)
(Total 7 marks)

2. A test has five questions. To pass the test, at least three of the questions must be answered correctly.

The probability that Mark answers a question correctly is $\frac{1}{5}$. Let X be the number of questions that Mark answers correctly.

(a) (i) Find E(X).

(ii) Find the probability that Mark passes the test.

(6)

Bill also takes the test. Let Y be the number of questions that Bill answers correctly.
The following table is the probability distribution for Y.

y	0	1	2	3	4	5
P($Y = y$)	0.67	0.05	$a + 2b$	$a - b$	$2a + b$	0.04

(b) (i) Show that $4a + 2b = 0.24$.

(ii) Given that E(Y) = 1, find a and b.

(8)

(c) Find which student is more likely to pass the test.

(3)
(Total 17 marks)

1. A biased coin is weighted such that the probability of obtaining a head is $\frac{4}{7}$. The coin is tossed 6 times and X denotes the number of heads observed. Find the value of the ratio $\frac{\mathrm{P}(X=3)}{\mathrm{P}(X=2)}$.

(Total 4 marks)

2. Over a one month period, Ava and Sven play a total of n games of tennis.

The probability that Ava wins any game is 0.4. The result of each game played is independent of any other game played.

Let X denote the number of games won by Ava over a one month period.

(a) Find an expression for $\mathrm{P}(X = 2)$ in terms of n.

(3)

(b) If the probability that Ava wins two games is 0.121 correct to three decimal places, find the value of n.

(3)

(Total 6 marks)