

# EXAMINATIONS

2 April 2003 (pm)

## Subject 201— Communications

*Time allowed: 1½ hours*

### ***INSTRUCTIONS TO THE CANDIDATE***

1. *Enter all the candidate and examination details as requested on the front of your answer booklet.*
2. *You have 15 minutes at the start of the examination in which to read the questions. You are strongly encouraged to use this time for reading only, but notes may be made. You then have 1½ hours to complete the paper.*
3. *You must not start writing your answers in the booklet until instructed to do so by the supervisor.*
4. *Attempt EITHER question 1 OR question 2 but NOT BOTH questions.*

### ***AT THE END OF THE EXAMINATION***

*Hand in BOTH your answer booklet, with any additional sheets firmly attached, and this question paper.*

<p><i>In addition to this paper you should have available Actuarial Tables and your own electronic calculator.</i></p>
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- 1** You are acting as a consultant to a computer manufacturer. The warranty on 1,100 computers sold 2 years ago is about to expire, and the manufacturer intends to write inviting their owners to extend their warranties.

The marketing manager is considering alternative options for the mailing as follows:

Alternative 1: Offer one year's additional warranty at a premium of £220, with an option to renew in a year's time at the same premium.

Alternative 2: Offer an additional two years' warranty at a premium of £370.

In either case, the cost of labour and parts for each renewed warranty will be £110 a year.

Based on similar offers in the past, the marketing manager believes that with Alternative 1 there is a 50% chance of any owner extending the warranty for the first year, and that there is a 50% chance that someone who extends will take up the second year's option. With Alternative 2, he believes that the chance of an owner accepting the offer increases to 55%.

The marketing manager has written asking for your guidance on two things:

- He wants to know the profit (before overheads) he will make from each alternative, assuming that his assumptions are correct, with a brief explanation of the calculations.
- His fixed costs for overheads (premises etc.) will be £85,000 over the two years. He wants to know how likely the profit from each alternative is to cover these costs. He does not require details of these calculations.

Draft your reply to the marketing manager in about 500 words.

Notes:

1. You should assume that owners will only be offered one of the alternatives, not a choice of either.
2. You should accept that the marketing manager's assumptions are correct.
3. You should ignore the cost of the mailings, the different timing of premium payments and the different timing of repairs and overhead costs.
4. You should assume that each owner acts independently, and that the Binomial Distribution applies.
5. With the Binomial Distribution, the expected number extending the warranty is  $np$ , where  $n$  is the number of owners and  $p$  is the probability of extending. The variance is  $np(1 - p)$ . For option 1 (where eligibility for the second year's extension is dependent on accepting the first), you may assume without calculation that the variance in the total number of premiums paid during the two years (allowing for both premiums paid by those who renew twice) is 11/16 times the number of owners.
6. Given the large number of PCs involved, you may use the Normal Distribution as an approximation to the Binomial Distribution in assessing the possible variation in the number of owners extending their warranty.

- 2 You work for an insurance company. A customer has written to query the latest annual statement on her investment policy, as follows:

10 London Road  
Anytown  
1 August 2003

Dear Sir/Madam,

Ref: Policy abc123456789

Two years ago I invested £10,000 into a 5 year investment policy with you that guaranteed to pay me my original investment plus 5% p.a. I therefore expected the policy would grow by £500 each year, so that it would now be worth £11,000, and when it matures it would be worth £12,500 — which will be exactly the amount I need to pay back some money that my parents have loaned to me.

Yesterday I received a statement from you that the cash value of the policy now is only £10,410, and worse still, that the payment at the end of the 5 years will be only £11,680 in today's money terms.

Please can you explain why the cash value is less than the £11,000 I had expected, and whether I'm going to have to find some extra funds to pay my parents the £12,500.

Yours faithfully,

Mary Smith

Your investigations have established that:

- the 5% p.a. interest is a compound rate, giving a maturity value of £12,763
- the policy has fixed cash-in values

	<i>Fixed Cash-in Values</i>				
During Year:	1	2	3	4	5
Value:	£9,100	£9,730	£10,410	£11,140	£11,920

- the fixed cash-in values were included in the original documentation given to the customer, but she may not have remembered it

Draft a letter to the customer to answer her questions in around 550 words.

Notes:

1. You should comment briefly that the cash-in values are lower in the early years due to initial expenses. You should not consider the details of how the fixed cash-in values were calculated.
2. You should not consider alternatives to surrendering the policy, such as selling the policy.
3. In the calculation at today's money terms, it is assumed that future price inflation will be at 3% p.a. This is an industry-standard assumption and you should not consider whether the rate is appropriate.
4. You do not need to take account of regulatory constraints and requirements.