6.13 Capture Recapture: 10-minute Pack

EDEXCEL 1MA1 · Calculator allowed · about 10 minutes

Total Marks

Name: _____ Date: ____ / ____ / _____

Answer ALL questions. Show all your working.

1 Priya marks 60 ladybirds and releases them. Later she catches 24 ladybirds, of which 8 are marked. Use capture-recapture to estimate the total number of ladybirds in the area.

(Total for Question 1 is 2 marks)

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2 For each statement, write True or False.

(i) The capture-recapture method assumes the population does not change between the two samples (no births, deaths, immigration or emigration).

(ii) A larger second sample will always give a less reliable estimate than a smaller one.

(iii) If marks fall off some animals before the second sample is caught, the population estimate will tend to be too high.

(iv) The formula for capture-recapture is $N = n1 + n2 - m$.

(Total for Question 2 is 4 marks)

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3 95 deer in a forest were caught, marked and released. A second sample of 90 deer was caught later. State one assumption that is needed for the capture-recapture estimate of the population of deer to be reliable.

(Total for Question 3 is 1 mark)

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4 In the Lincoln-Petersen estimator N = n1 * n2 / m, explain what happens to N if the number m of marked recaptures doubles, all else remaining the same.

(Total for Question 4 is 2 marks)

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Mark scheme · 6.13 Capture Recapture: 10-minute Pack

Question 1

use N = (number marked in first sample times size of second sample) / number of marked recaptured, i.e. N = 60 * 24 / 8 oe	**M1**
180 cao	**A1**

Answer: 180

Question 2

(i) True	**B1**
(ii) False	**B1**
(iii) True	**B1**
(iv) False	**B1**

Answer: (i) True (ii) False (iii) True (iv) False

Question 3

a valid assumption, e.g. the marks have not been lost or rubbed off between the two samples	**B1**

Answer: The marks have not been lost or rubbed off between the two samples

Question 4

state that N is inversely proportional to m, N proportional to 1/m	**M1**
therefore if m doubles then N is halved cao	**A1**

Answer: N is halved (if m doubles and n1 and n2 do not change, N becomes half).

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