

# Homework 18B – Solutions

- 1) Serviced  $0.04 \times \pounds 230 + \pounds 50 = \pounds 59.20$   
 Not serviced  $0.1 \times \pounds 230 = \pounds 23$   
 Better to not have it serviced.

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| Question | Working  | Answer             | Mark | Notes  |
|----------|--|--------------------|------|--|
| (a)      | 0.4 and 0.6<br>0.8 and 0.2 then 0.4 and 0.6                          | Correct probs      | 2    | B1 first pair of branches<br>B1 both second pairs of branches  |
| (b)      | $0.6 \times 0.6$   | 0.36               | 2    | M1 ' $0.6 \times 0.6$ '<br>A1 ft   |
| (c)      | $0.6 \times 0.6 + 0.4 \times 0.2$                                    | 0.44               | 2    | M1 ' $0.6 \times 0.6 + 0.4 \times 0.2$ '<br>A1 ft  |
| (d)*     | $0.56 \times \pounds 5000 - 0.44 \times \pounds 3000 = \pounds 1480$ | Correct comparison | 3    | M1 for either $(1 - 0.44) \times \pounds 5000$ or $0.44 \times \pounds 3000$<br>M1 for a complete method for not cancelling<br>C1 (dep on M1) For comparing a loss of $\pounds 1000$ with an expected profit of $\pounds 1480$ |

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|     |                        |   |  |
|-----|------------------------|---|--|
| (a) |                        | M1<br>A2,1,0<br>M1<br>A1<br>m1<br>A1F<br>A1 | Diagram<br><br>One early time correct<br>Early times<br>One of 'their' late times correct<br>Condone one independent slip<br>All correct |
| (d) | Critical C, H, I, J, K | B1  |  |
| (e) | 2                      | B1  |  |
|     | <b>TOTAL</b>           | <b>10</b>                                   |  |

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|        |   |                    |  |
|--------|---|--------------------|--|
| 4) (a) | Obtaining 7 or 8 correct cfs (seen or implied)<br>7, 21, 46, 62, 70, 80, 84, 88 ( $\pm \frac{1}{2}$ sq)<br>Plotting cfs at ucbs (7 or 8) must be on vertical lines<br>Curve must pass $\pm \frac{1}{2}$ sq of points  | B1<br>B1<br>B1     | ignore $< (2.6, 7)$<br>bar chart B1 (heights)<br>All (a), (b) and (c) only ft a non straight increasing heights function<br>Allow 1 consistent error<br><br>Smooth curve or polygon through points |
| (b)    | median $\approx \pounds 9880$ from "correct" location<br>IQR $\approx \pounds 18200 - \pounds 5460$ from "correct" locations<br>$\approx \pounds 12740$   | B1ft<br>M1<br>A1ft | $\pm \frac{1}{2}$ sq (22.25, 44.5, 66.25)<br>Condone 000s missing  |
| (c)    | Females' incomes in London are (on average) higher than those in the North (compare medians $\pounds 9880 > \pounds 7800$ )<br><br>The females' incomes in the North are consistently smaller than those of London. (compare IQRs) (must be interpretation for 2 marks) | B1<br><br>B2       | B1 IQR for London is higher than IQR of the North<br>B1 range same or compare Lower quartiles only or upper quartiles only.  |
|        | <b>TOTAL</b>  | <b>9</b>           |  |

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# Homework 18B – Solutions

| Q     | Solution   | Marks | Total | Comments                                      |
|-------|--|-------|-------|---|
| 3(a)  | Accept the equivalent percentage answers with %-sign in parts (a)(i) to (a)(iv) but not in parts (a)(v) and (b) (see GNS)  |       |       |   |
| (i)   | $P(A_{41-65}) = \frac{176}{500} = \frac{88}{250} = \frac{44}{125} = 0.352$   | B1    | (1)   | CAO; any one of four listed answers           |
| (ii)  | $P(A_{2-66} \cap B_2) = \frac{68}{500} = \frac{34}{250} = \frac{17}{125} = 0.136$  | B1    | (1)   | CAO; any one of four listed answers           |
| (iii) | $P(A_{19-40} \cap B_{21}) = \frac{17+62}{500} = \frac{79}{500} = 0.158$  | M1    | (2)   | Numerator CAO                                 |
|       |  | A1    |       | CAO   |
| (iv)  | $P(A_{2-41}   B_2) = \frac{(35+68)/500}{130/500} \text{ or } \frac{(130-5-22)/500}{130/500} \text{ or } \frac{103}{130} = 0.792$   | M1    | (2)   | Fraction CAO                                  |
|       |  | A1    |       | AWRT (0.79231)                                |
| (v)   | $P(B_{22}   A_{-65}) = \frac{5+(0)+22+3+35+31}{80+104+176} \text{ or } \frac{96}{360} = \frac{48}{180} \text{ or } \frac{24}{90} \text{ or } \frac{12}{45} \text{ or } \frac{4}{15} = 0.267$ | M1    | (3)   | Numerator CAO (130 - 68 + 40 - 6)             |
|       |  | M1    |       | Denominator CAO (500 - 140)                   |
|       |  | (M2)  |       | (Accept numerator and denominator each + 500) |
|       |  | A1    |       | CAO (3 dp only) (0.26667)                     |
|       |  |       | 9     |   |

|  |                     |   |  |
|--|---------------------|---|--|
| Expected sales:<br>Market itself:<br>$0.7 \times 100000 + 0.2 \times 200000 + 0.1 \times 50000 = 160000$<br>Go into partnership:<br>$0.2 \times 100000 + 0.3 \times 200000 + 0.5 \times 50000 = 330000$<br>$60/100 \times 330000 = 198000$ | Go into partnership | 6 | M1 One correct calculation shown in method for calculating expected value of one option e.g. $0.7 \times 100000$<br>M1 Complete method for Market itself OR Go into partnership<br>M1 For working with percentages to find the commission payable or income received from Go into partnership eg $0.4 \times 0.5 \times 500000 (= 100000)$ or $0.6 \times 0.5 \times 500000 (= 150000)$<br>A1 Manufacture itself = 160000<br>A1 Go into partnership = 198000<br>C1(dep M2) ft Correct choice based on their two calculated values or group of figures. |
|--|---------------------|---|--|

|              |   |    |          |   |
|--------------|---|----|----------|---|
| 7) (a)       | $342 = \frac{400}{(1+i)^2}$               | M1 | 4        | Need more than 2 sf<br>Do not accept 8.14, or 8.1<br>Accept 8.148<br>8.147 is given M2 A1 |
|              | $(1+i)^2 = \frac{400}{342}$               | M1 |          |   |
|              | $1+i = \sqrt[3]{1.16959}$                 | A1 |          |   |
|              | Interest rate is 8.15%                    | A1 |          |   |
| (b)          | $\frac{R}{1.14} + \frac{R}{1.14^2} = 342$ | M1 | 3        | Accept 207.70   |
|              | $2.14 R = 342 \times 1.14^2$              | M1 |          |   |
|              | Amount is £207.69                         | A1 |          |   |
| <b>Total</b> |   |    | <b>7</b> |   |

|              |  |             |          |   |
|--------------|--|-------------|----------|---|
| 8) (a)       | Annual income is $12 \times £4075 = £48\ 900$            | B1          | 3        | ft from a yearly amount<br>CAO<br>Condone if 38 900 seen and then divided by 12 |
|              | Taxable income = $£48\ 900 - 10\ 000 = £38\ 900$         | M1 ft<br>A1 |          |   |
| (b)          | Tax at 20% is $£37\ 500 \times \frac{20}{100} = £7\ 500$ | M1          | 5        | ft from (a) if needs 40%  |
|              | Amount taxed at 40% is $£38\ 900 - £7\ 500 = £31\ 400$   | A1          |          |   |
|              | Tax paid at 40% is $£31\ 400 \times 40\% = £12\ 560$     | M1          |          |   |
|              | Tax paid is $£7\ 500 + £12\ 560 = £20\ 060$              | A1          |          |   |
|              | Tax paid is £20 060                                      | A1          |          |   |
| <b>Total</b> |  |             | <b>8</b> |   |

TOTAL: 63