(a) (i) $30{,}000 \times (0.8) = €24{,}000$

(ii) $24{,}000 \times 0.8 = €19{,}200$

(b) Vat: $4{,}716 - 4{,}500 = 216$

$\frac{Vat}{cost\ before\ Vat} \rightarrow \frac{216}{4{,}500} \times 100 = 4.8\%$

(c) $1.125x = 52{,}875$

$x = \frac{52{,}875}{1.125} = €47{,}000$

(a) (i) $z_1 = 4 + 3i$, $z_2 = 0 + 2i$, $z_3 = -2 - i$

(ii) (Distance from the centre)

$|z_2| = 2$

(b) $\frac{15}{1+2i} \times \frac{1-2i}{1-2i}$

$\frac{15-30i}{1+2i-2i+4} = \frac{15-30i}{5}$

$3 - 6i$

(c) Box C

Reason: the conjugate is reflected in the real axis

(a) Set B

Cost A: $\frac{12}{60} = 0.2$
Cost B: $\frac{28}{150} = 0.1867$

(b) $\frac{-b \pm \sqrt{b^2-4ac}}{2a}$

$a = 3 \, , b = -5 \, , c = 1$

$\frac{5 \pm \sqrt{(-5)^2-4(3)(1)}}{2(3)}$

$x = 0.23 \quad , \quad x = 1.43$

(c) $y = -2x + 5$ (sub into other equation)

$x^2 + (-2x+5)^2 = 25$

$x^2 + 4x^2 - 20x + 25 = 25$

$5x^2 - 20x = 0$

$5x(x-4) = 0$

$5x = 0 \qquad x - 4 = 0$

$x = 0 \qquad x = 4$ (sub back in to find y-values)

$y = 5 - 2(0) = 5 \qquad y = 5 - 2(4) = -3$

$(0\,,5) \; and \; (4\,,-3)$

(a) $8x - 20 - 1 = 3x + 7$

$5x = 28$

$x = 5.6$

(b) $154 = \frac{7}{12}$ of the bill

Marthas is: $\frac{5}{12}$

$\frac{154}{\frac{7}{12}} \times \frac{5}{12} = €110$

(c) (i) 2^7

(ii) $2^7 = 2^{4x+1}$

$7 = 4x + 1$

$6 = 4x$

$x = 1.5$

(a) $\frac{3(2)+5}{10} - \frac{1}{2+3}$

$\frac{11}{10} - \frac{1}{5} = \frac{9}{10}$

(b) $f'(x) = 10x - 20$

$10x - 20 = 0$

$x = 2$ (sub back into original equation)

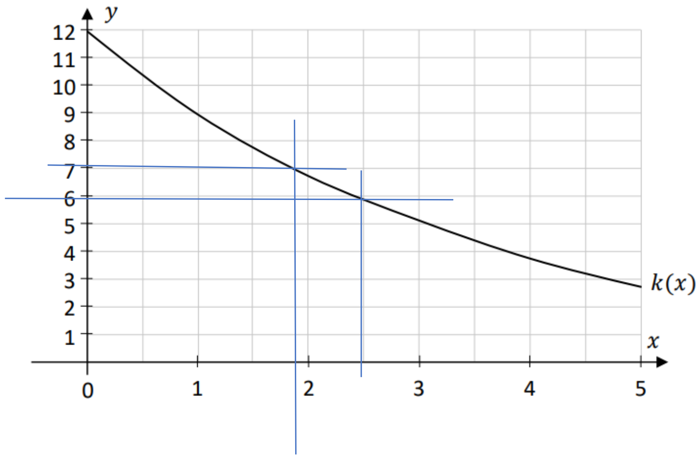
$5(2)^2 - 20(2) + 2 = -18$

$(2\,, -18)$

(c) $\frac{2}{3}$

(a) (i) $y = 5.8$

(ii) $x \geq 1.8$



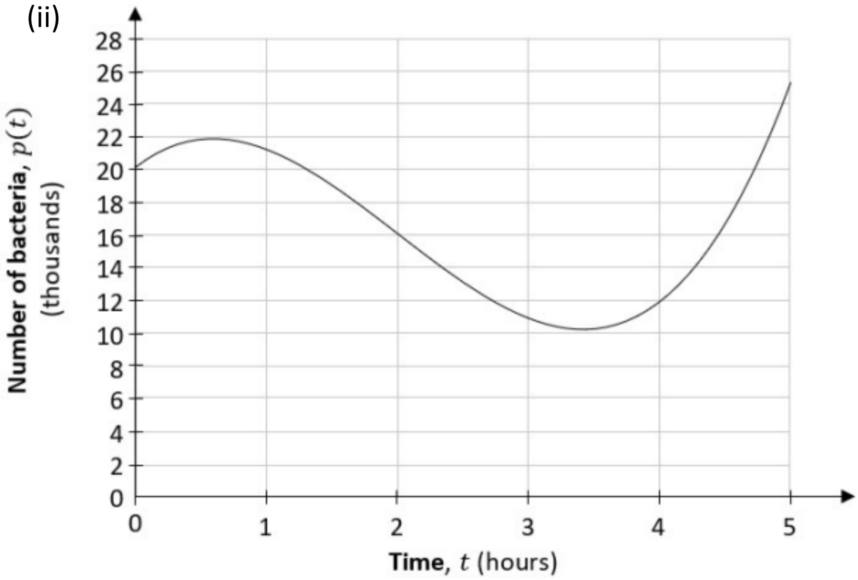
(b) (i) Area $= \frac{1}{2}[12 + 2.8 + 2(9 + 6.8 + 5.1 + 3.8)] = 32.1 units^2$

(ii) $\frac{estimated - actual}{actual} \rightarrow \frac{32.1 - 31.8}{31.8} \times 100 = 0.94\%$

(a) (i)

Time	0	1	2	3	4	5
Number of bacteria	**20**	**21**	16	**11**	12	**25**

(ii)



(iii) $p'(t) = 3t^2 - 12t + 6$

(iv) $p'(2) = 3(2)^2 - 12(2) + 6 = -6$

(v) After 4 hours the number of bacteria was growing at a rate of 6000 per hour.

(b) (i) **After 1 hour:**

$3{,}000 \times 2.72^{0.5(1)} = 4{,}948$

After 2 hours:

$3{,}000 \times 2.72^{0.5(2)} = 8{,}160$

(ii) $3{,}000 \times 2.72^{0.5(3)} = 13{,}458$

$3{,}000 \times 2.72^{0.5(4)} = 22{,}195$

$3{,}000 \times 2.72^{0.5(5)} = 36{,}605 > 35{,}000$

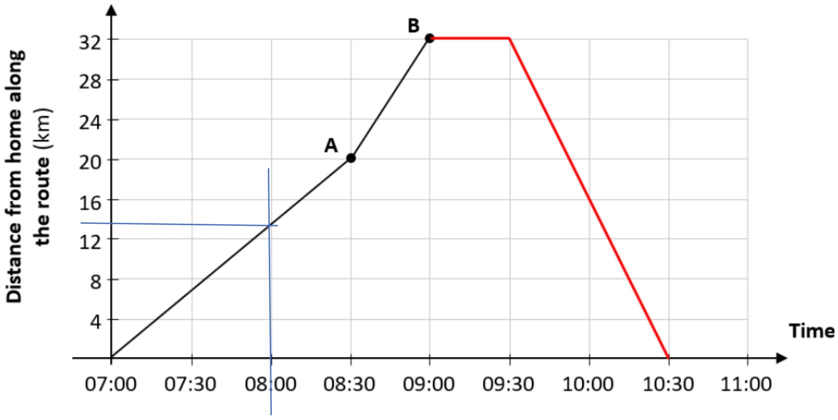
$n = 5\ hours$

(a) (i) $13km$

(ii) $32 - 20 = 12$

$\frac{12}{30} \times 60 = 24kmph$

(iii)



(b) (i)

Week	1	2	3	4	5	6
Distance	6	7·5	**9**	**10·5**	**12**	**13·5**

(ii) $T_n = a + d(n-1) \;\rightarrow a = 6\;,\; c = 1.5$

$T_{100} = 6 + 1.5(100 - 1) = 154.5km$

(iii) Eventually it will be too far for her to run

(iv) $S_n = \frac{n}{2}[2a + (n-1)d]$

$S_n = \frac{n}{2}(2(6) + (n-1)1.5)$

(v) $S_{10} = \frac{10}{2}\big(12 + (10-1)(1.5)\big) = 127.5km$

(a) (i) $\frac{59.5}{0.85} = €70$

(ii) $70 \times 8 = €560$

$560 \times 0.8 = €448$

(b) $\frac{28{,}000 \times 394}{244} = 45{,}213g$

$\frac{45{,}213}{1{,}000} = 45.2kg$

(c) (i) $A(20) = 17{,}600 - 160(20) = 14{,}400$

(ii) $12{,}800 = 17{,}600 - 160x$

$17{,}600 - 12{,}800 = 160x$

$x = \frac{17{,}600 - 12{,}800}{160} = €30$

(d) (i) $15{,}000x - 150x^2 = 360{,}000$

$150x^2 - 15{,}000x + 360{,}000 = 0$

$\frac{150x^2 - 15{,}000x + 360{,}000}{150} = \frac{0}{150}$

$x^2 - 100x + 2{,}400 = 0$

(ii) $x^2 - 100x + 2{,}400 = 0$

$(x - 40)(x - 60) = 0$

$x = €40 \quad and \quad x = €60$

(a) (i) $48{,}000 - 7{,}650 - 1{,}920 - 1{,}407 = €37{,}023$

(ii) $\frac{37{,}023}{48{,}000} \times 100 = 77\%$

(b) (i) $34{,}000 \times 0.2 = 6{,}800$

$6{,}800 - 3{,}550 = 3{,}250$

$34{,}000 - 3{,}250 = €30{,}750$

(ii) $40{,}000 \times 0.2 = 8{,}000$

$(50{,}000 - 40{,}000) \times 0.4 = 4{,}000$

$8{,}000 + 4{,}000 - 3{,}550 = €8{,}450$

(iii) $3{,}550 \times 5 = €17{,}750$

(iv) $(42{,}000 - 40{,}000) \times (0.4 - 0.2) = €400$

(c) (i) $A = (1{,}950 + 400) \times \frac{120}{365} \times 0.3 = €231.78$

(ii) $2{,}250 \times \frac{x}{365} \times 0.3 = 135$

$\frac{x}{365} = \frac{135}{2{,}250(0.3)}$

$x = \frac{135(365)}{2{,}250(0.3)} = 73$ days