Start here for Question Number: 4

(a)(i) $T_n = a + (n-1)d$ $a = 1000$ $d = 750$ $n = 9$

$T_9 = 1000 + (8) \times 750$

$= 7000\ m$

$= 7\ km.$

(ii) $T_n = 10000$

$10000 = 1000 + (n-1) \times 750$

$10000 = 1000 + 750n - 750$

$10000 = 250 + 750n$

$9750 = 750n$

$n = 13$

∴ in the 13th week Susannah runs her first 10 km.

(iii) $S_{26} = \frac{n}{2}\left(2 \times a + (n-1) \times d\right)$

$S_{26} = \frac{26}{2}\left(2 \times 1000 + (25) \times 750\right)$

$= 13\left(2000 + (25) \times 750\right)$

$= 13\,(20750)$

$= 269\,750\ m$

$= 269.75\ kms.$

∴ She runs a total of 269.75 km or 269 750 m.

(b) $\int_0^2 e^{2x} - e^{-x}\, dx$.

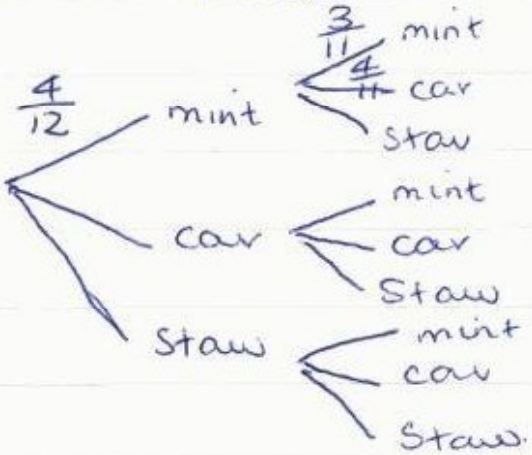
$= \left[\frac{e^{2x}}{2} + e^{-x}\right]_0^2$

$= \left[\frac{e^{2\times 2}}{2} + e^{-2}\right]$

$= 27.4\ 344103$

$= 27.4$ units^2.

(c).



(i) $\frac{1}{11}$.

(ii) $\frac{3}{11}$

(iii). P(not same centre) = 1 − P(same centre)

$= 1 - \frac{3}{11}$

$= \frac{8}{11}$

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(d) $f(x) = 1 + e^x$

$f(-x) = 1 + e^{-x}$

$\therefore (1 + e^x) \times (1 + e^{-x}) = 1 + e^{-x} + e^x + e^{-2x}$

$= 1 + (e^{-x})^2.$

$(1 + e^x) + (1 + e^{-x}) = 1 + (e^{-x})^2.$

$\therefore f(x) \times f(-x) = f(x) + f(-x)$ as required

You may ask for an extra Writing Booklet if you need more space to answer question 4.