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(a) 26 weeks

week 1 → 1 km
week 2 → 1 km + 750 m
week 2 → 1 km + 1500
⋮
week n → 10 km

(i) $1 + 1.75 + 2.5 \ldots + 10$

$\frac{T_2}{T_1} = \frac{T_3}{T_2} = \frac{1.75}{1} = \frac{2.5}{1.75}$

$T_2 - T_1 = T_3 - T_2$

$1.75 - 1 = 2.5 - 1.75$: AP.

$T_n = a + (n-1)d$
$T_9 = 1 + (9-1)0.75$
$= 1 + 6$
$= 7$ km's

$T_n = 1 + (n-1)0.75$

$10 = 1 + 0.75n - 0.75$

$10 = 0.75n + 0.25$

$0.75n = 9.75$

$n = 13$

∴ on week 13 she runs 10km for the first time.

(iii) $S_n = \frac{n}{2}(a + l)$

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

$S_{13} = \frac{13}{2}(1 + 10) = 71.5$ km

$S_{13} = \frac{13}{2}(2(1) + (13-1))$

$= 91$

∴ she travells 162.5 km over 26 weeks.

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(b)

$$\int_0^2 e^{2x} - e^{-x}\, dx$$

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

$$= \left[\left(2e^{2(2)} + e^{-(2)}\right) - \left(2e^{2(0)} + e^{-(0)}\right) \right]$$

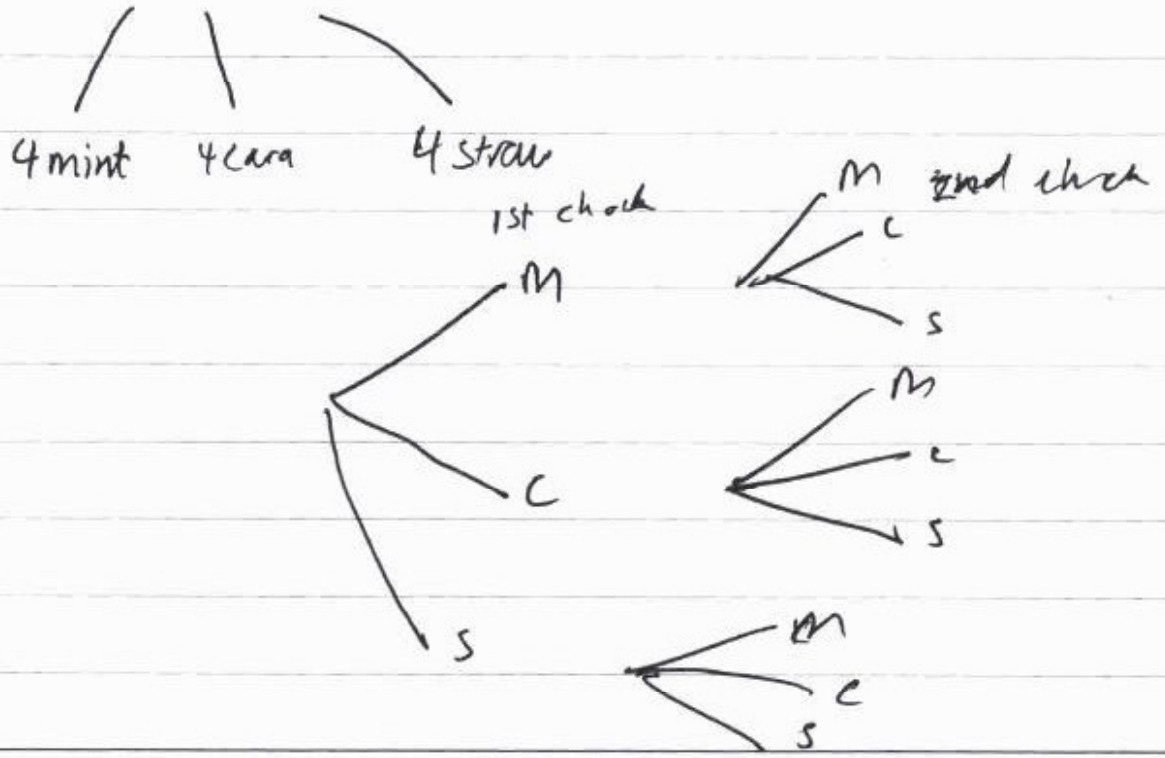
$$= 2e^4 + e^{-2} - 2 + 1$$

$A = (2e^4 + e^{-2} - 1)\ u^2$ for $u = e^2$

$A = 2u^2 + u^1$

$= 2u^2 + \frac{u}{1}$

(c) 12 chock



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

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MM $= \frac{1}{4} \times \frac{1}{3} = \frac{1}{12}$

(ii) $\frac{1}{4} \times \frac{1}{8} = \frac{1}{32}$

(iii) $\frac{1}{4} \times \frac{12}{11} = \frac{3}{11}$

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

$(1+e^x) \times -(1+e^x) = (1+e^x) \neq -(1+e^x)$

$(1+e^x)(-1-e^x) = (1+e^x) - (1+e^x)$

$-1 - e^x - e^x - e^{2x} = 1 + e^x - 1 - e^x$

$-1 - 2e^x - e^{2x} = 0$

$0 = e^{2x} + 2e^x + 1$ let $u = e^x$

$\therefore 0 = u^2 + 2u + 1$

$= (u+1)(u+1)$

$u = -1$

$\therefore e^x = -1$

~~[illegible]~~

$\therefore x = 0$

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