iii) $\lambda = 1$, $M - RT = M/2$ so $M = 2RT$ ✓

$$V = \frac{u}{\lambda}\left(1 - \left(\frac{M - Rt}{M}\right)^{\lambda}\right) \checkmark$$

$$\frac{dx}{dt} = \frac{u}{\lambda}\left(1 - \left(\frac{M - Rt}{M}\right)^{\lambda}\right) = u\left(1 - \left(\frac{M - kt}{M}\right)\right) = \frac{ukt}{M} \checkmark$$

3/3

$$\int dx = \frac{ukt}{M}\,dt$$

$$\int_0^x dx = \int_0^T \frac{ukt}{M}\,dt \checkmark$$

$$\left[x\right]_0^x = \left[\frac{ukt^2}{2M}\right]_0^T = \frac{uT^2}{2M}$$? 2/2

$$x = \frac{ukT^2}{2M} = \frac{ukT^2}{2(2kT)} = \frac{uT}{4}$$ ✓ when fuel has all burnt 2/2

2) $f(x) = \cos x$

at $x = 0$, $f(x) = \cos 0 = 1$ ✓

at $x = \pi/6$ $f(x) = \cos \pi/6 = \sqrt{3}/2$ ✓

at $x = \pi/3$ $f(x) = \cos \pi/3 = 1/2$ ✓

Pud $f(-x) = p(x) = a + bx + cx^2$

at $x = 0$, $p(x) = a + b(0) + c(0)^2 = 1$ ✓

at $x = \pi/6$ $p(x) = a + b(\pi/6) + c(\pi/6)^2 = \sqrt{3}/2$ ✓

at $x = \pi/3$ $p(x) = a + b(\pi/3) + c(\pi/3)^2 = 1/2$ ✓ 2/2

Put into augmented matrix form and row reduce

$$\begin{bmatrix} a & 0 & 0 & 1 \\ a & b\pi/6 & b\pi^2/36 & \sqrt{3}/2 \\ a & b\pi/3 & c\pi^2/9 & 1/2 \end{bmatrix} \equiv \begin{bmatrix} a & 0 & 0 & 1 \\ 0 & b\pi/6 & c\pi^2/36 & \sqrt{3}/2 - 1 \\ 0 & b\pi/3 & c\pi^2/9 & -1/2 \end{bmatrix}$$ ✓

Tell me what the row operations are.

$$\equiv \begin{bmatrix} a & 0 & 0 & 1 \\ 0 & b\pi/6 & c\pi^2/36 & \sqrt{3}/2 - 1 \\ 0 & 0 & c\pi^2/18 & 3/2 - \sqrt{3} \end{bmatrix} \equiv \begin{bmatrix} a & 0 & 0 & 1 \\ 0 & b\pi/6 & 0 & \sqrt{3} - 7/4 \\ 0 & 0 & c\pi^2/18 & 3/2 - \sqrt{3} \end{bmatrix}$$

DIVISION signs! ☺

$$\begin{bmatrix} a & 0 & 0 & 1 \\ 0 & b & 0 & \frac{6}{\pi}(\sqrt{3} - 7/4) \\ 0 & 0 & c & \frac{18}{\pi^2}(3/2 - \sqrt{3}) \end{bmatrix} \Rightarrow \begin{aligned} a &= 1 \\ b &= -0.0428 \approx -0.0343 \checkmark \\ c &= -0.42321 \approx -0.4232 \checkmark \end{aligned}$$

correct to four d.p. ✓

$\therefore p(x) =$ ~~~~ ? ✓ 2/3