$$\frac{d^2M}{dx^2} = -10e^{-x^2} \qquad M(0) = 0, \quad M(6) = 0$$

$h = 1.5$ Euler Shooting Method to estimate $M(1.5), M(3), M(4.5)$

Let $\frac{dM}{dx} = V$; $M(0) = 0$; $\frac{dV}{dx} = -10e^{-x^2}$, $V(0) = ?$

$V_a = 0$

$M_1 = 0 + 1.5[0] = 0$; $V_1 = 0 + 1.5[-10e^{-0^2}] = -15$

$M_2 = 0 + 1.5[-15] = -22.5$; $V_2 = -15 + 1.5[-10e^{-1.5^2}] \approx -16.581$

$M_3 = \cancel{0} \overset{-22.5}{+} + 1.5[-16.581] \approx -47.372$; $V_3 = -16.581 + 1.5[-10e^{-3^2}] \approx -16.583$

$M_4 = -47.372 + 1.5[-16.583] \approx -72.247 = y_a$

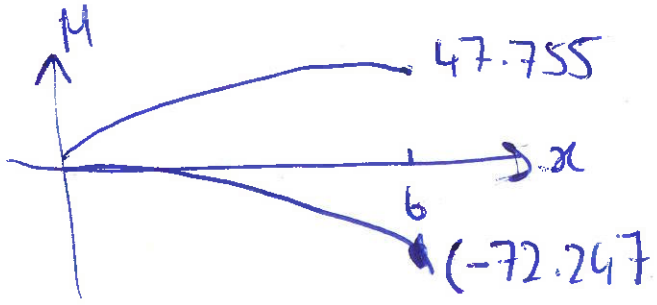
$V_b = 20$

$M_1 = 0 + 1.5[20] = 30$; $V_1 = 20 + 1.5[-10e^{-0^2}] = +5$

$M_2 = 30 + 1.5[5] = 37.5$; $V_2 = 5 + 1.5[-10e^{-1.5^2}] \approx 3.4190$

$M_3 = 37.5 + 1.5[3.419] \approx 42.629$; $V_3 = 3.419 + 1.5[-10e^{-3^2}] \approx 3.4171$

$M_4 = 42.629 + 1.5[3.4171] \approx 47.755 = y_b$



Rough Work:

$$v(0) = 0 + \frac{72.247}{47.755 + 72.247} + 20 \approx 12.041$$

$M_1 = 0 + 1.5[12.041] \approx 18.062$; $V_1 = 12.041 + 1.5[-10e^{-0^2}] \approx -2.959$

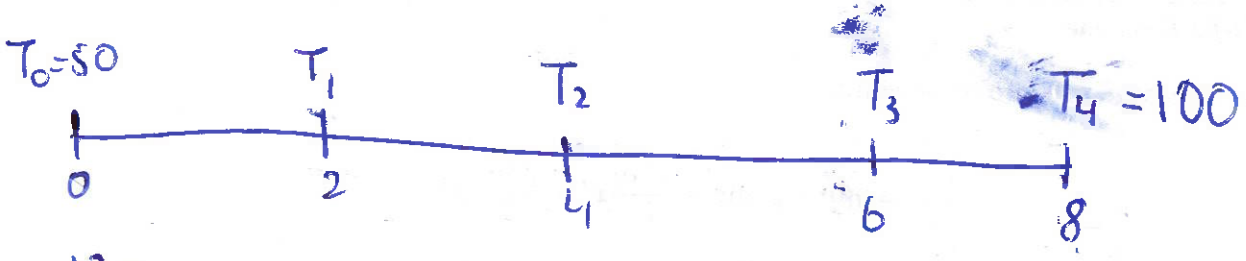
$M_2 = 18.062 + 1.5[-2.959] \approx 13.624$; $V_2 = -2.959 + 1.5[-10\,e^{-1.5^2}] \approx -4.5400$

$M_3 = 13.624 + 1.5[-4.5400] \approx 6.814$; $V_3 \approx -4.5419$

$M_4 \approx 0.0355 \approx 0$

Rough Work:

P.90 Exercise 2 $[T(2), T(4), T(6)]$



$$\frac{d^2T}{dx^2} + 0.2(10-T) \approx \frac{T_{i+1} - 2T_i + T_{i-1}}{(\Delta x)^2} + 0.2(10-T_i) = 0$$

$$\Rightarrow T_{i+1} - 2T_i + T_{i-1} + 8 - 0.8T_i = 0$$

$$\Rightarrow 2.8T_i = T_{i+1} + T_{i-1} + 8$$

$$\Rightarrow T_i = \frac{T_{i+1} + T_{i-1} + 8}{2.8}$$

$$T_1 = \frac{T_2 + 58}{2.8} \qquad T_1^0 = 50$$

$$T_2 = \frac{T_3 + T_1 + 8}{2.8} \qquad T_2^0 = 75$$

$$T_3 = \frac{T_2 + 108}{2.8} \qquad T_3^0 = 100$$

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Rough Work:

$$T_1^{(1)} = \frac{75+58}{2\cdot 8} \approx 47.5$$

$$T_2^{(1)} = \frac{100+47.5+8}{2\cdot 8} \approx 55.536$$

$$T_3^{(1)} = \frac{55.536+108}{2\cdot 8} \approx 58.406$$

$$T_1^{(2)} = \frac{55.536+58}{2\cdot 8} \approx 40.549 \approx T(2)$$

$$T_2^{(2)} = \frac{58.406+40.549+8}{2\cdot 8} \approx 38.198 \approx T(4)$$

$$T_3^{(2)} = \frac{38.198+108}{2\cdot 8} \approx 52.214 \approx T(6)$$

Not close to convergence

eg. $|T_3^{(2)} - T_3^{(1)}| = 6.192 = 0.12|T_3^{(2)}|$

Suggests correct to ... 0 s.f.