

$$4. \sum_{k=1}^7 2^k = \sum_{k=1}^7 2^k = 2^1 + 2^2 + 2^3 + 2^4 + 2^5 + 2^6 + 2^7 = \boxed{254}$$

$$6. \quad a = 0 \quad b = 2 \quad n = 10 \quad \Delta t = \frac{2-0}{10} = 0.2$$

$$t_i = [0, 0.2, 0.4, 0.6, 0.8, 1.0, 1.2, 1.4, 1.6, 1.8, 2.0]$$

$$12. \quad f(t) = 1+t^3 \quad [0, 1] \quad n=5 \quad \Delta t = \frac{1-0}{5} = \frac{1}{5} = 0.2$$

$$T_L = 0.2 [f(0) + f(0.2) + f(0.4) + f(0.6) + f(0.8)]$$

$$= 0.2 [1 + 1.008 + 1.064 + 1.216 + 1.512] = 0.2(5.8) = \boxed{1.16}$$

$$T_R = 0.2 [f(0.2) + f(0.4) + f(0.6) + f(0.8) + f(1)]$$

$$= 0.2 [1.008 + 1.064 + 1.216 + 1.512 + 2] = 0.2(6.8) = \boxed{1.36}$$

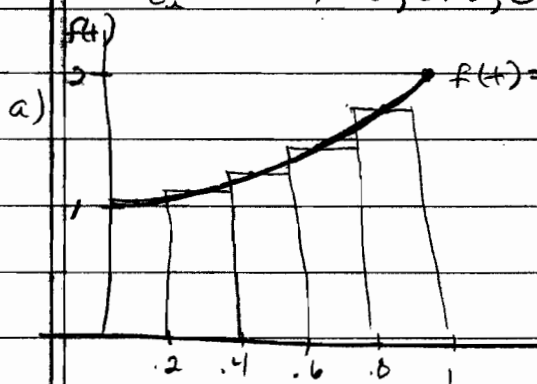
$$16. \quad \Delta x = \frac{1-0}{5} = 0.2$$

$$T_L = \sum_{i=0}^4 (1+t_i^3) \Delta t = \sum_{i=0}^4 (1+t_i^3) 0.2$$

$$T_R = \sum_{i=1}^5 (1+t_i^3) \Delta t = \sum_{i=1}^5 (1+t_i^3) 0.2$$

24. $f(t) = 1+t^3$ $[0, 1]$ - $[0, 1]$ $n=5$ $\Delta t = \frac{1-0}{5} = 0.2$

$t_i = [0, 0.2, 0.4, 0.6, 0.8, 1.0]$ midpoints = $[0.1, 0.3, 0.5, 0.7, 0.9]$



← I_m (midpoint!)

b) $I_m = \sum_{i=0}^4 f\left(\frac{t_i + t_{i+1}}{2}\right) \Delta t = \sum_{i=0}^4 \left(1 + \left(\frac{t_i + t_{i+1}}{2}\right)^3\right) \Delta t = \sum_{i=0}^4 \left(1 + \left(\frac{t_i + t_{i+1}}{2}\right)^3\right) \cdot 0.2$

c) $I_m = 0.2 [f(0.1) + f(0.3) + f(0.5) + f(0.7) + f(0.9)]$
 $= 0.2 [1.001 + 1.027 + 1.125 + 1.343 + 1.729]$
 $= \boxed{1.245}$

26. Total = $\sum_{i=1}^7 B_i = 0 + 8 + 15 + 24 + 31 + 11 + 3 = 92$
 where $B_i = \#$ of offspring each year

34. $\Delta t = 1.0$

$T_1 = 1.0 [127 + 122 + 118 + 115 + 113 + 112 + 112 + 113 + 116 + 120] = \boxed{1168.0}$

$T_2 = 1.0 [122 + 118 + 115 + 113 + 112 + 112 + 113 + 116 + 120 + 125] = \boxed{1166.0}$

28. $B_i = \frac{i(i+1)}{2} + 4$

$B = \sum_{i=0}^7 \frac{i(i+1)}{2} + 4 = \left(\frac{0(0+1)}{2} + 4\right) + \left(\frac{1(1+1)}{2} + 4\right) + \left(\frac{2(2+1)}{2} + 4\right) + \left(\frac{3(3+1)}{2} + 4\right) + \left(\frac{4(4+1)}{2} + 4\right) + \left(\frac{5(5+1)}{2} + 4\right) + \left(\frac{6(6+1)}{2} + 4\right) + \left(\frac{7(7+1)}{2} + 4\right)$
 $= 4 + 5 + 7 + 10 + 14 + 19 + 25 + 32 = \boxed{116}$