Math 1210 HW 32 Sec 4.5: 2, 8, 10, 12, 14, 17, 24, 29, 37, 38

2. $\int_0^2 2t\,dt = t^2\Big]_0^2 = 2^2 - 0^2 = 4$ This value is in between I_L & I_R computed in 4.4 #10.

8. $\int_{-2}^{2} (y^4 + 5y^3)\,dy = \frac{1}{5}y^5 + \frac{5}{4}y^4\Big]_{-2}^{2} = \frac{1}{5}(2)^5 + \frac{5}{4}(2)^4 - \left(\frac{1}{5}(-2)^5 + \frac{5}{4}(-2)^4\right)$

≈ 12.8

10. $\int_1^4 3z^{\frac{3}{7}}\,dz = \frac{21}{10} z^{\frac{10}{7}}\Big]_1^4 = \frac{21}{10}\left[4^{\frac{10}{7}} - 1^{\frac{10}{7}}\right] \approx 13.12$

12. $\int_{1.2}^{2.4} (5z^{-1.2} - 1.2)\,dz = \frac{5}{-0.2} z^{-0.2} - 1.2z\Big]_{1.2}^{2.4} = \frac{5}{-0.2}(2.4)^{-0.2} - 1.2(2.4) - \left(\frac{5}{-0.2}(1.2)^{-0.2} - 1.2\right.$

≈ 1.68

14. $\int_0^1 (3e^x + 2x^3)\,dx = 3e^x + \frac{2}{4}x^4\Big]_0^1 = 3e^1 + \frac{2}{4}(1)^4 - \left(3e^0 + \frac{2}{4}(0)^4\right)$

$= 3e^1 + \frac{1}{2} - 3 \approx 5.65$

17. $\int_0^{\pi} (2\sin(x) + 3\cos(x))\,dx = -2\cos(x) + 3\sin(x)\Big]_0^{\pi}$

$= -2\cos(\pi) + 3\sin(\pi) - (-2\cos(0) + 3\sin(0))$

$= -2(-1) + 0 - (-2(1) + 0) = 2 + 2 = 4$

24. $\int_0^2 \frac{1}{1+4t}\,dt = \int \frac{1}{u}\frac{1}{4}\,du = \frac{1}{4}\ln|1+4t|\Big]_0^2$

$= \frac{1}{4}\left[\ln|1+4(2)| - \ln|1+4(0)|\right] = \frac{1}{4}\left[\ln(9) - \ln(1)\right]$

$= \frac{1}{4}\ln 9 \approx 0.549$

let $u = 1+4t$

$du = 4dt$

$\frac{1}{4}du = dt$

$\int_1^2 (e^t + \frac{1}{t})\,dt = e^t + \ln|t| \Big]_1^2 = e^2 + \ln|2| - (e^1 + \ln(1)) \approx 5.36$

$\int_2^3 (e^t + \frac{1}{t})\,dt = e^t + \ln|t| \Big]_2^3 = e^3 + \ln|3| - (e^2 + \ln(2)) \approx 13.10$

$\int_1^3 (e^t + \frac{1}{t})\,dt = e^t + \ln|t| \Big]_1^3 = e^3 + \ln|3| - (e^1 + \ln(1)) \approx 18.46$

$\therefore \int_1^2 (e^t + \frac{1}{t})\,dt + \int_2^3 (e^t + \frac{1}{t})\,dt = \int_1^3 (e^t + \frac{1}{t})\,dt$

37 $L(1.5) - L(0.5) = \int_{0.5}^{1.5} 64.3 e^{-1.19t}\,dt = \frac{64.3}{-1.19} e^{-1.19t} \Big]_{0.5}^{1.5}$

$= -54.03 \left[e^{-1.19(1.5)} - e^{-1.19(0.5)} \right] = 20.74$ cm

or –

$\frac{dL}{dt} = 64.3 e^{-1.19} \qquad L(0) = 5$

$L(t) = -54.03\, e^{-1.19t} + C$

$L(0) = -54.03 e^{-1.19(0)} + C = 5 \Rightarrow C = 59.03$

$L(t) = -54.03 e^{-1.19t} + 59.03$

$L(1.5) - L(0.5) = 49.97 - 29.29 = \boxed{20.74}$

38 $\int_{1985}^{1987} 523.8(t-1981)^2\,dt = \frac{523.8}{3} (t-1981)^3 \Big]_{1985}^{1987}$

Side: $u = t - 1981$

$du = dt$

$\int 523.8(t-1981)^2 dt = 523.8 \int u^2 du$

$= 523.8 \frac{u^3}{3}$

$= 174.6 \left[(1987-1981)^3 - (1987-1985)^3 \right]$

$= 174.6 \left[6^3 - 4^3 \right] = 26539$ cases.