SOLUTIONS ASSIGNMENT #11
NYA ELECTROTECH

P.748

#3 $\int_0^1 2x\,dx = x^2\Big|_0^1 = 1-0 = \boxed{1}$

#5 $\int_1^4 x^{5/2}\,dx = \frac{2}{7}x^{7/2}\Big]_1^4 = \frac{2^8}{7} - \frac{2}{7} = \boxed{\frac{254}{7}}$

#9 $\int_{-1.6}^{0.7} (1-x)^{1/3} = -\frac{3}{4}(1-x)^{4/3}\Big]_{-1.6}^{0.7} = (-0.151) - (-2.681) = \boxed{2.53}$

#13 $\int_{0.5}^{2.2} x^{1/3} - 2\,dx = \frac{3}{4}x^{4/3} - 2x\Big|_{0.5}^{2.2} = (-2.25) - (-0.702) = \boxed{-1.55}$

#27 $\int_0^2 2x(9-2x^2)^2\,dx$

$u = 9-2x^2$

$du = -4x\,dx$

$-\frac{1}{2}du = 2x\,dx$

Bounds $x=2 \quad u=1$

$x=0 \quad u=9$

$= \int_9^1 -\frac{1}{2}u^2\,du$

$= -\frac{1}{6}u^3\Big|_9^1$

$= -\frac{1}{6}\left(1-729\right) = \boxed{121.33}$

#29 $\int_0^1 (x^2+3)(x^3+9x+6)^2\,dx$

$u = x^3+9x+6$

$du = 3x^2+9\,dx$

$\frac{1}{3}du = x^2+3\,dx$

$x=1 \quad u=16$

$x=0 \quad u=6$

$= \int_6^{16} \frac{1}{3}u^2\,du$

$= \frac{u^3}{9}\Big]_6^{16} = \frac{1}{9}\left[16^3 - 6^3\right] = \boxed{3880/9}$

#35 $\int_0^1 x^3\,dx = x^4/4\,\Big]_0^1 = \boxed{1/4}$ & $\int_1^2 x^3 dx = \frac{x^4}{4}\Big|_1^2$

So $\int_0^1 x^3dx + \int_1^2 x^3dx = 1/4 + 15/4 = 4$ $= 4 - 1/4 = \boxed{15/4}$

whereas $\int_0^2 x^3dx = \frac{x^4}{4}\Big|_0^2 = \frac{2^4}{4} = 4$ same value

#38 $\int_{-1}^{1} t^{2K}\,dt$ $K>0$

$= \left.\frac{t^{2K+1}}{2K+1}\right|_{-1}^{1} = \left(\frac{1}{2K+1}\right) - \left(\frac{-1}{2K+1}\right) = \boxed{\frac{2}{2K+1}}$

P. 834

#9 $\int_0^{\pi/8} \cos 2x \sin 2x\,dx$

$u = \sin 2x$

$du = 2\cos 2x\,dx$

$\frac{1}{2}du = \cos 2x\,dx$

$x=0 \quad u = \sin 0 = 0$

$x=\pi/8 \quad u = \sin \pi/4 = 1/\sqrt{2}$

$= \int_0^{1/\sqrt{2}} \frac{1}{2} u\,du$

$= \frac{1}{4}u^2 \Big|_0^{1/\sqrt{2}}$

$= \frac{1}{4}\left(\frac{1}{2}\right) = \boxed{\frac{1}{8}}$

#17 $\int_0^{1/2} \frac{\ln(2x+3)}{2x+3}dx$

$u = \ln(2x+3)$

$du = \frac{2}{2x+3}dx$

$x = 1/2 \quad u = \ln 4$

$x = 0 \quad u = \ln 3$

$= \int_{\ln 3}^{\ln 4} \frac{1}{2} u\,du$

$= \frac{1}{4}u^2 \Big|_{\ln 3}^{\ln 4}$

$= \frac{1}{4}\left((\ln 4)^2 - (\ln 3)^2\right)$

$\doteq \boxed{0.1787}$

#27 $\int_0^2 \frac{1+\tan^{-1}2x}{1+4x^2}\,dx$

$u = 1+\tan^{-1}2x$

$du = \frac{1}{1+4x^2}(2)\,dx$

$\frac{1}{2}du = \frac{1}{1+4x^2}\,dx$

$x=2 \quad u = 1+\tan^{-1}4 = 2.326$

$x=0 \quad u = 1+\tan^{-1}0 = 1$

$= \int_1^{2.326} \frac{1}{2}u\,du$

$= \frac{1}{4}u^2 \Big|_1^{2.326}$

$= \frac{1}{4}(5.409 - 1)$

$\approx \boxed{1.102}$

P. 837

11 $\int_0^{\pi/2} \frac{\cos x}{1+\sin x}\,dx$

$u = 1+\sin x$

$du = \cos x\,dx$

$x = \pi/2 \quad u = 1+\sin\pi/2 = 2$

$x = 0 \quad u = 1+\sin 0 = 1$

$= \int_1^2 \frac{1}{u}\,du$

$= \ln|u| \Big|_1^2$

$= \ln 2 - \ln 1 = \boxed{\ln 2}$

#19 $\int_1^3 \frac{1+x}{4x+2x^2}\,dx$

$u = 4x+2x^2$

$du = 4+4x\,dx$

$\frac{1}{4}du = 1+x\,dx$

$x=3 \quad u = 30$

$x=1 \quad u = 6$

$= \int_6^{30} \frac{1}{4u}\,du$

$= \frac{1}{4}\ln|u| \Big|_6^{30}$

$= \frac{1}{4}(\ln 30 - \ln 6)$

$= \frac{1}{4}(\ln 5) \approx \boxed{0.40}$

#21 $\int \frac{0.5}{r \ln r}\, dr$ $\quad u = \ln r$, $du = \frac{1}{r}\, dr$

$= \int \frac{0.5}{u}\, du$

$= 0.5 \ln|u| + C$

$= \boxed{0.5 \ln(\ln r) + C}$

P. 840

7 $\int_{-2}^{2} 6e^{s/2}\, ds$ $\quad u = s/2$, $du = \frac{1}{2}\, ds$, $12\, du = 6\, ds$

$= \int_{-1}^{1} 12e^{u}\, du$ $\quad s = 2 \Rightarrow u = 1$, $s = -2 \Rightarrow u = -1$

$= 12e^{u} \Big|_{-1}^{1}$

$= 12(e - e^{-1}) = \boxed{12\left(e - \frac{1}{e}\right)} \approx 28.2$

#11 $\int_{1}^{4} \frac{e^{\sqrt{x}}}{\sqrt{x}}\, dx$ $\quad u = \sqrt{x}$, $du = \frac{1}{2\sqrt{x}}\, dx$, $2\, du = \frac{1}{\sqrt{x}}\, dx$

$= \int_{1}^{2} 2e^{u}\, du$ $\quad x = 4 \Rightarrow u = 2$, $x = 1 \Rightarrow u = 1$

$= 2e^{u} \Big|_{1}^{2}$

$= 2(e^2 - e) = \boxed{9.34}$

#17 $\int_1^3 3e^{2x}(e^{-2x}-1)\,dx$

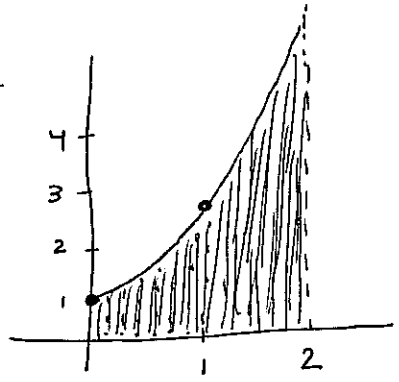
$= \int_1^3 3(e^0 - e^{2x})\,dx$

$= 3x - \frac{3}{2}e^{2x}\Big|_1^3$

$= (9 - \frac{3}{2}e^6) - (3 - \frac{3}{2}e^2)$

$= \boxed{6 - \frac{3}{2}e^6 + \frac{3}{2}e^2} \approx \boxed{-588.06}$

#27



$\int_0^2 3e^x\,dx = 3e^x\Big|_0^2 = \boxed{3e^2 - 3}$

≈ 19.17

P. 844

#15 $\int_0^{\pi/6} \frac{1}{(\cos 2x)^2}\,dx$

$= \int_0^{\pi/6} \sec^2 2x\,dx$

$= \frac{1}{2}\tan 2x\Big|_0^{\pi/6}$

$= \frac{1}{2}\left(\sqrt{3}\right) = \boxed{\sqrt{3}/2}$

#16 $\int_0^1 \frac{2e^s}{\sec e^s}\,ds$ $\quad u = e^s$, $du = e^s ds$

$= \int_1^e 2\cos u\,du$ $\quad s=1 \;\; u=e$, $s=0 \;\; u=e^0=1$

$= 2\sin u\Big|_1^e$

$= \boxed{2(\sin e - \sin 1)} = -0.861$