hw set 6
sect 5.5
p392

2. $\int x(4+x^2)^{10}\,dx$, $u = 4+x^2$

$du = 2x\,dx$

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

$\frac{1}{2}\int u^{10}\,du$

$= \frac{1}{2}\cdot\frac{1}{11}u^{11} = \frac{(4+x^2)^{11}}{22}$

8. $\int x^2(x^3+5)^9\,dx$ $u = x^3+5$

$du = 3x^2dx$

$\int \frac{1}{3}u^9\,du = \frac{1}{30}u^{10}$

$= \frac{(x^3+5)^{10}}{30}$

14. $\int \frac{x}{(x^2+1)^2}\,dx$ $u = x^2+1$

$du = 2x\,dx$

$\int \frac{1}{2}u^{-2}\,du = -\frac{1}{2}u^{-1} = \frac{-1}{2x^2+2}$

27. $\int \sec^3 x\tan x\,dx$

$u = \sec x$

$du = \sec x\tan x\,dx$

$= \int u^2\,dx = \frac{u^3}{3}$

$= \frac{\sec^3 x}{3} = \frac{1}{3\cos^3 x}$

46. $\int_0^{\pi/2} \cos x\sin(\sin x)\,dx$

$u = \sin x$

$du = \cos x\,dx$

$\Rightarrow \int \sin(u)\,du$

$= -\cos(u) = -\cos(\sin x)\Big|_0^{\pi/2}$

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

$= -\cos(1) + \cos(0)$

$= 1 - \cos(1)$

6. $\int e^{\sin\theta}\cos\theta\,d\theta$, $u = \sin\theta$

$du = \cos\theta\,d\theta$

$\int e^u\,du = e^u$

$= e^{\sin\theta}$

10. $\int xe^{x^2}\,dx$ $u = x^2$

$du = 2x\,dx$

$\int \frac{1}{2}e^u\,dx = \frac{1}{2}e^u$

$= \frac{1}{2}e^{x^2}$

18. $\int y^3(2y^4-1)^{1/2}\,dy$ $u = 2y^4-1$

$du = 8y^3\,dy$

$\frac{1}{8}\int u^{1/2}\,du$

$= \frac{1}{12}u^{3/2}$

$= \frac{1}{12}(2y^4-1)^{3/2}$

33. $\int \frac{1+x}{1+x^2}\,dx$

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

$= \arctan(x) + \frac{1}{2}\ln(1+x^2)$

$\begin{cases} u = 1+x^2 \\ du = 2x\,dx \end{cases}$ (only on 2nd integral)

49. $\int_0^1 \frac{e^z+1}{e^z+z}\,dz$ $u = e^z+z$

$du = e^z+1\,dz$

$= \int \frac{1}{u}\,du$

$= \ln u$

$= \ln(e^z+z)\Big|_0^1$

$= \ln(e+1) + -\ln(e^0+0)$

$= \ln(e+1)$