Problem, Compute $\int$

a) $\int x\sin(2x)$ $\qquad uv-\int v\,du.$

$u=x,\ du=dx,\ dv=\sin 2x,\ v=-\frac{1}{2}\cos 2x$

$-\frac{1}{2}x\cos 2x-\int\frac{1}{2}\cos 2x\,dx$ $\qquad u=2x$, $du=2dx$, $dx=\frac{du}{2}$

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

$\boxed{-\frac{1}{2}x\cos 2x+\frac{1}{4}\sin 2x\,dx}+C$

b) $\int x e^{x^2}dx$ $\qquad u=x^2,\ du=2x\,dx,\ \frac{du}{2x}=dx$

$\int x e^{u}\frac{du}{2x}\rightarrow\frac{1}{2}\int e^{u}du\rightarrow$

$\boxed{\frac{1}{2}e^{x^2}}+C$

c. $\int xe^x$ $\qquad uv-\int v\,du$ $\qquad v=\int e^x,\ e^x$

$u=x,\ du=dx$ $\qquad dv=e^x$

$\boxed{xe^x-e^x}+C$

d $\int e^{x^2}=\int\left(1+x^2+\frac{x^4}{2}+\frac{(x^6)}{6}\right)+dx.$

$\boxed{x+\frac{1}{3}x^3+\frac{x^5}{10}+\frac{x^7}{42}}+C$

e. $\int x\sqrt{1+x}\,dx$ $\qquad \int(u^2-1)\cdot u\cdot 2u\,du$

$u=\sqrt{1+x}$ $\qquad 2\int u^4-u^2\,du$

$x=u^2-1$ $\qquad \frac{2}{5}u^5-\frac{2}{3}u^3+C$

$dx=2u\,du$ $\qquad \boxed{\frac{2}{5}(1+x)^{5/2}-\frac{2}{3}(1+x)^{3/2}+C}$

i $\int\frac{x^2+2}{7-x^2}dx$

$\int\left(\frac{2}{7}+\frac{9x^2}{49}+\frac{9x^4}{343}\right)dx$

$\boxed{\frac{2}{7}x+\frac{3x^3}{49}+\frac{9}{5}\cdot\frac{x^5}{343}+C}$

j $\int\frac{1}{ap-bp^2}dp$

$\frac{1}{p}\cdot\frac{1}{(a-bp)}$

f. $\int\sec(\theta)d\theta$

$\boxed{\ln(\sec\theta+\tan\theta)+C}$

g $\int\sec(\theta)^2$

$\boxed{\tan(\theta)+C}$

h $\int\operatorname{sech}^2\theta$

$\boxed{\tanh(x)+C}$