13.) $\int y e^{y^2} dy = \frac{1}{2} \int e^u \, du$

$u = y^2$

$du = 2y \, dy$

$\frac{du}{2} = y \, dy$

$= \frac{1}{2} e^u + C$

$= \frac{1}{2} e^{y^2} + C$

12.) $\int \tan^{-1}x \cdot \frac{1}{1+x^2}\,dx$

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

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

$\int u\,du$

$\frac{u^2}{2} + C$

$\frac{(\tan^{-1}x)^2}{2} + C$

11.) $\displaystyle\int \frac{\cos x}{\sqrt{9-\sin^2 x}}\,dx = \arcsin\left(\frac{\sin x}{3}\right)\Big]_0^{\pi}$

$a = 3$

$u = \sin x$

$du = \cos x\,dx$

$= \arcsin\left(\frac{\frac{1}{2}}{3}\right) - 0$

$= \arcsin \frac{1}{6}$

$\arcsin(\sin(x))$

x

24.) $\int \frac{\cos x}{4\sin^2 x + 3}\,dx$

$a = \sqrt{3}$

$u = 2\sin x$

$du = 2\cos x\,dx$

$\frac{1}{2} \cdot \frac{1}{\sqrt{3}} \arctan \frac{2\sin x}{\sqrt{3}}$

$+ C$

9.) $\int \frac{e^x}{1+e^{2x}}\,dx$ $\sqrt{e^{2x}} = e^x$

$a = 1$

$u = e^x$

$du = e^x\,dx$

$\frac{1}{1}\arctan\frac{e^x}{1} + C$

27.) $\int_0^a \frac{x}{\sqrt{a^2-x^2}}\,dx = -\frac{1}{2}\int u^{-1/2}\,du$

$\underline{u\text{-sub}}$

$u = a^2 - x^2$

$du = -2x\,dx$

$-\frac{1}{2} \cdot \frac{u^{1/2}}{1/2}$

$-(a^2-x^2)^{1/2}\Big]_0^a$

$-\left(0 - (a^2)^{1/2}\right)$

$+(-a)$ $\quad -a$

26.)

$$\begin{array}{r|rrr} 2 & 1 & -3 & 7 \\ & & 2 & -2 \\ \hline & 1 & -1 & 5 \end{array}$$

$$\int \left(x - 1 + \frac{5}{x-2} \right) dx$$

$$\frac{1}{2}x^2 - x + 5\ln|x-2| + C$$

17.) $\int \frac{e^{2x} - e^{4x}}{e^{x}}\,dx = \int (e^{x} - e^{3x})\,dx$

$u = 3x$
$du = 3dx$

$$e^{x} - \frac{1}{3}e^{3x} + c$$

18.) $\int \frac{5dx}{5x\sqrt{25x^2 - 1}} = \frac{1}{1}\operatorname{arcsec}\frac{|5x|}{1} + c$

$a = 1$
$u = 5x$
$du = 5dx$

25.) $\frac{1}{10}\int \frac{10x}{\sqrt{4-(5x^2+3)^2}}dx$

$\frac{1}{10}\cdot \arcsin\frac{5x^2+3}{2}+C$

$a=2$

$u=5x^2+3$

$du=10x\,dx$

2	12
3	15
4	19
6	24
8	
9	

19.) $\displaystyle\int \frac{x\,dx}{\sqrt{4x^2+9}}$

$u = 4x^2 + 9$

$du = 8x\,dx$

$\frac{1}{8}\int u^{-1/2}\,du = \frac{1}{8}\cdot\frac{u^{1/2}}{1/2} + C$

$\frac{1}{4}\sqrt{4x^2+9} + C$

8.) $\int \frac{2dx}{2x\sqrt{4x^2 - 1}}$

$a = 1$

$u = 2x$

$du = 2dx$

$\frac{1}{1} \text{arcsec} \frac{|2x|}{1} + C$