

LESSON 12 solution

1.  $\int \frac{-x}{\sqrt{4-x^2}} dx$   
 $u = 4-x^2$   
 $\frac{du}{2} = \frac{-2x dx}{2}$   
 $\frac{1}{2} \int \frac{du}{\sqrt{u}} = \frac{1}{2} \cdot \frac{1}{2} u^{1/2} + C$   
 $\sqrt{4-x^2} + C$

2.  $\int \frac{5}{1-x} dx$   
 $u = 1-x$   
 $\frac{du}{-1} = \frac{-dx}{-1}$   
 $-5 \int \frac{du}{u}$   
 $-5 \ln|u| + C$   
 $-5 \ln|1-x| + C$

3.  $\int \sin(6x) e^{\cos(6x)} dx$   
 $\frac{du}{6} = \frac{-6 \sin(6x) dx}{6}$   
 $-\frac{1}{6} \int e^u du$   
 $-\frac{1}{6} e^u + C$   
 $-\frac{1}{6} e^{\cos(6x)} + C$

4.  $\int \frac{3x^4 - 6x^2 + 2x - 3}{x^2} dx$   
 Divide first!  
 $\int (3x^2 - 6 + \frac{2}{x} - \frac{3}{x^2}) dx$   
 $x^3 - 6x + 2 \ln|x| + \frac{3}{x} + C$

5.  $\int_0^{\pi} \tan x dx$   
 $\int \frac{\sin x}{\cos x} dx$   
 $u = \cos x$   
 $\frac{du}{-1} = \frac{-\sin x dx}{-1}$   
 $-\int \frac{du}{u} = -\ln|u|$   
 OR  $-\ln|\cos x| \Big|_0^{\pi}$   
 $= -\ln \frac{1}{2} - \ln 1$   
 $-\ln(\frac{1}{2}) = \ln 2$

6.  $\int_1^e \frac{\ln x}{x} dx$   
 $u = \ln x$   
 $\frac{du}{1/x} = \frac{dx}{x}$   
 $\int u du = \frac{u^2}{2}$   
 OR  $\frac{(\ln x)^2}{2} \Big|_1^e$   
 $\frac{1}{2} - 0 = \frac{1}{2}$

7.  $\int \frac{x^2}{(16-x^3)^2} dx$   
 $u = 16-x^3$   
 $\frac{du}{-3} = \frac{-3x^2 dx}{-3}$   
 $-\frac{1}{3} \int \frac{du}{u^2}$   
 $-\frac{1}{3} \left( \frac{-1}{u} \right) + C$   
 $\frac{1}{3(16-x^3)} + C$

8.  $\int \tan^4 x \sec^2 x dx$   
 $u = \tan x$   
 $du = \sec^2 x dx$   
 $\int u^2 du$   
 $\frac{u^3}{3} + C$   
 $\frac{\tan^3 x}{3} + C$