HW 7.2 p. 338 22, 23, 25, 27, 30, 33, 35, 38

Monday, February 16, 2015 6:21 AM

(22) $\int \frac{9r^2\,dr}{\sqrt{1-r^3}}$

$u = 1-r^3$

$\frac{du}{dr} = -3r^2$

$-3[\,du = -3r^2\,dr]$

$-3du = 9r^2\,dr$

$= \int \frac{-3\,du}{\sqrt{u}}$

$= \int -3u^{-\frac{1}{2}}\,du = -3(2)u^{\frac{1}{2}} + C$

$= \boxed{-6\sqrt{1-r^3} + C}$

Check $\frac{d}{dx}(-6\sqrt{1-r^3} + C) = -6(\frac{1}{2}(1-r^3)^{-\frac{1}{2}}(-3r^2)) + 0$

$= \frac{9r^2}{\sqrt{1-r^3}}$ ✓

(23) $\int (1-\cos\frac{t}{2})^2 \sin\frac{t}{2}\,dt$

$u = 1-\cos\frac{t}{2}$

$\frac{du}{dt} = \sin\frac{t}{2} \cdot \frac{1}{2}$

$du = \frac{1}{2}\sin\frac{t}{2}\,dt$

$2du = \sin\frac{t}{2}\,dt$

$= \int 2u^2\,du$

$= 2(\frac{1}{3})u^3 + C$

$= \frac{2}{3}(1-\cos\frac{t}{2})^3 + C$

Check: $\frac{d}{dx}(\frac{2}{3}(1-\cos\frac{t}{2})^3 + C)$

$= \frac{2}{3}(3)(1-\cos\frac{t}{2})^2(\sin\frac{t}{2})(\frac{1}{2}) + 0$

$= (1-\cos\frac{t}{2})^2(\sin\frac{t}{2})$ ✓

(25) $\int \frac{dx}{(1-x)^2}$

$u = 1-x$

$\frac{du}{dx} = -1$

$du = -dx$

$-du = dx$

$= \int \frac{-du}{u^2}$

$= \int -u^{-2}\,du$

$= +\frac{1}{u} + C$

$= \boxed{\frac{1}{1-x} + C}$

(27) $\int \sqrt{\tan x}\,\sec^2 x\,dx$

$u = \tan x$

$\frac{du}{dx} = \sec^2 x$

$du = \sec^2 x\,dx$

$= \int \sqrt{u}\,du$

$= \frac{2}{3}u^{\frac{3}{2}} + C$

$= \boxed{\frac{2}{3}(\tan x)^{\frac{3}{2}} + C}$

(30) $\int 3(\sin x)^{-2}\,dx$

$= \int 3\csc^2 x\,dx$

$= \boxed{-3\cot x + C}$

(33) $\int \frac{\ln^6 x}{x}\,dx$

$u = \ln x$

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

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

$= \int u^6\,du$

$= \frac{1}{7}u^7 + C$

$= \boxed{\frac{1}{7}\ln^7 x + C}$

(35) $\int s^{\frac{1}{3}} \cos(s^{\frac{4}{3}} - 8)\,ds$

$u = s^{\frac{4}{3}} - 8$

$\frac{du}{dx} = \frac{4}{3}s^{\frac{1}{3}}$

$du = \frac{4}{3}s^{\frac{1}{3}}\,dx$

$\frac{3}{4}du = s^{\frac{1}{3}}\,dx$

$= \frac{3}{4}\int \cos u\,du$

$= \frac{3}{4}\sin u + C$

$= \boxed{\frac{3}{4}\sin(s^{\frac{4}{3}} - 8) + C}$

(38) $\int \frac{6\cos t}{(2+\sin t)^2}\,dt$

$u = 2+\sin t$

$\frac{du}{dx} = \cos t$

$du = \cos t\,dt$

$6du = 6\cos t\,dt$

$= 6\int \frac{du}{u^2}$

$= 6\int u^{-2}\,du$

$= 6(-1)u^{-1} + C$

$= \frac{3}{4}\sin(s^{\frac{4}{3}} - 8) + C$

$= -6\int u\,du$

$= 6(-1)u^{-1} + C$

$= \frac{-6}{2+\sin t} + C$