HW 6.2 p. 338 50, 60, 62, 64, 65, 71, 73-76

Tuesday, February 17, 2015 10:18 AM

(50) $\int 4\cos^2 x\,dx$

$\cos 2x = 2\cos^2 x - 1$

$\cos 2x + 1 = 2\cos^2 x$

$= \int 2(2\cos^2 x)dx$

$= \int 2(\cos 2x + 1)dx$

$= 2\int \cos 2x\,dx + \int 2\,dx$

$= 2\sin 2x\left(\frac{1}{2}\right) + 2x + C$

$= \boxed{\sin 2x + 2x + C}$

(60) $\int_0^{\frac{\pi}{6}} \cos^{-3} 2\theta \sin 2\theta\, d\theta$

$u = \cos 2\theta$

$\frac{du}{d\theta} = -2\sin 2\theta$

$du = -2\sin 2\theta\, d\theta$

$-\frac{1}{2}du = \sin 2\theta\, d\theta$

$u(0) = \cos 2(0) = 1$

$u\left(\frac{\pi}{6}\right) = \cos 2\left(\frac{\pi}{6}\right) = \frac{1}{2}$

$= -\frac{1}{2}\int_1^{\frac{1}{2}} u^{-3}\,du =$

$-\frac{1}{2}\left(-\frac{1}{2}\right)u^{-2}\Big|_1^{\frac{1}{2}}$

$= \frac{1}{4}\left(\frac{1}{2}\right)^{-2} - \frac{1}{4}(1)^{-2} = 1 - \frac{1}{4} = \boxed{\frac{3}{4}}$

(62) $\int_2^5 \frac{dx}{2x-3}$

$u = 2x - 3$

$\frac{du}{dx} = 2$

$du = 2dx$

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

$u(2) = 1$

$u(5) = 7$

$= \frac{1}{2}\int_1^7 \frac{1}{u}\,du$

$= \frac{1}{2}\ln|u|\Big|_1^7 = \frac{1}{2}(\ln 7 - \ln 1)$

$= \boxed{\frac{1}{2}\ln 7}$

(64) $\int_{\frac{\pi}{4}}^{\frac{3\pi}{4}} \cot x\,dx = \int_{\frac{\pi}{4}}^{\frac{3\pi}{4}} \frac{\cos x}{\sin x}dx$

$u = \sin x$

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

$du = \cos x\,dx$

$= \int_{\frac{\sqrt{2}}{2}}^{\frac{\sqrt{2}}{2}} \frac{1}{u}\,du = \boxed{0}$

$u\left(\frac{\pi}{4}\right) = \frac{\sqrt{2}}{2}$

$u\left(\frac{3\pi}{4}\right) = \frac{\sqrt{2}}{2}$

(65) $\int_{-1}^{3} \frac{x\,dx}{x^2+1}$

$u = x^2 + 1$

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

$du = 2x\,dx$

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

$u(-1) = 2$

$u(3) = 10$

$= \frac{1}{2}\int_2^{10} \frac{1}{u}\,du$

$= \frac{1}{2}\ln|u|\Big|_2^{10}$

$= \frac{1}{2}(\ln 10 - \ln 2) = \boxed{\frac{1}{2}\ln 5}$

(71) $\int_0^{\frac{\pi}{4}} \tan^3 x \sec^2 x\,dx \overset{?}{=} \int_0^{\frac{\pi}{4}} u^3\,du$

False the Interval would change

(73) $\int \tan x\,dx = \int \frac{\sin x}{\cos x}dx$

$u = \cos x$

$\frac{du}{dx} = -\sin x$

$-du = \sin x\,dx$

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

$= -\ln|u| + C = -\ln|\cos x| + C$

$\boxed{D}$

(74) $\int_0^2 e^{2x}dx = \frac{1}{2}e^{2x}\Big|_0^2 = \frac{1}{2}e^4 - \frac{1}{2}e^0$

$= \frac{1}{2}e^4 - \frac{1}{2}$

$\boxed{E}$

(76) Not Yet!

(75) $\int^5 f(x-a)dx = 7 = F(5-a) - F(3-a)$

75 $\int_3^5 f(x-a)\,dx = 7 = F(5-a) - F(3-a)$

then $\int_{3-a}^{5-a} f(x)\,dx = F(5-a) - F(3-a)$

same $= \boxed{7}$

$\boxed{B}$