NAME: SOLUTIONS

QUIZ 10b

Dawson College
Course Code: 201-NYA-05 S07
Date: April 22nd 2010
Instructor: E. Richer

Question 1. *(5 marks each)*
Use substitution to integrate the following.
(a)

$$\int \frac{-2\arcsin^7(5x)}{\sqrt{1-25x^2}}dx$$

Let $u = \arcsin(5x)$

$du = \frac{1}{\sqrt{1-25x^2}} 5\,dx$ so $\frac{1}{5}du = \frac{1}{\sqrt{1-25x^2}}dx$

$$= \int -\frac{2}{5}u^7\,du = -\frac{2}{5}\frac{u^8}{8} + C$$

$$= \boxed{\frac{-1}{20}(\arcsin 5x) + C}$$

(b)

$$\int 4(\sec^2(3x))e^{-\tan(3x)}dx$$

Let $u = -\tan(3x)$

$du = -3\sec^2(3x)\,dx$

$-\frac{1}{3}du = \sec^2(3x)\,dx$

$$= \int -\frac{4}{3}e^u\,du$$

$$= -\frac{4}{3}e^u + C$$

$$= \boxed{-\frac{4}{3}e^{-\tan 3x} + C}$$

(c)

$$\int \frac{\cos t}{\sqrt{1+\sin t}}dt \qquad \text{Let } u = 1+\sin t$$
$$du = \cos t\, dt$$

$$= \int \frac{1}{\sqrt{u}}\,du = \int u^{-1/2}\,du$$

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

$$= \boxed{2(1+\sin t)^{1/2} + C}$$

(d)

$$\int \frac{4x}{3-6x^2}dx \qquad \text{Let } u = 3-6x^2$$
$$du = -12x\,dx$$
$$-\tfrac{1}{3}\,du = 4x\,dx$$

$$= \int \frac{-1}{3u}\,du$$

$$= -\frac{1}{3}\ln|u| + C$$

$$\boxed{= -\tfrac{1}{3}\ln|3-6x^2| + C}$$

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Question 1. *(5 marks each)*
Use substitution to integrate the following.

(a)

$$\int \frac{\arccos^5(3x)}{\sqrt{1-9x^2}}dx$$

Let $u = \arccos(3x)$

$du = \frac{-3}{\sqrt{1-9x^2}}dx$

$-\frac{1}{3}du = \frac{dx}{\sqrt{1-9x^2}}$

$= \int -\frac{1}{3}u^5\,du$

$= -\frac{1}{3}\frac{u^6}{6} + C$

$= \boxed{-\frac{1}{18}\arccos(3x)+C}$

(b)

$$\int 4(\sec^2 x)e^{-\tan x}dx$$

Let $u = -\tan x$

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

$= \int -4e^u\,du$

$= -4e^u + C$

$= \boxed{-4e^{-\tan x} + C}$

(c)

$$\int \frac{\sin t}{\sqrt{1+\cos t}}dt$$

Let $u = 1+\cos t$

$du = -\sin t\,dt$

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

$= \int -u^{-1/2}du = -\frac{u^{1/2}}{1/2} + C = \boxed{-2(1+\cos t)^{1/2} + C}$

(d)

$$\int \frac{2x}{3-12x^2}dx$$

Let $u = 3-12x^2$

$du = -24x\,dx$

$-\frac{1}{12}du = 2x\,dx$

$= \int -\frac{1}{12}\left(\frac{1}{u}\right)du$

$= -\frac{1}{12}\ln|u| + C = \boxed{\frac{-1}{12}\ln|3-12x^2| + C}$