Math 1211: Quiz #1 **Winter 2016**

Name: SOLUTIONS	A#:	Section:

1. $\int \frac{dx}{(2+3x)^4}$

$u = 2+3x, \quad du = 3\,dx$

$= \frac{1}{3}\int \frac{du}{u^4}$

$= \frac{1}{3}\cdot\left(-\frac{1}{3}u^{-3}\right) + C$

$= \boxed{-\frac{1}{9}(2+3x)^{-3} + C}$

2. $\int \frac{\sin\sqrt{t}}{\sqrt{t}}\,dt$

$u = \sqrt{t}, \quad du = \frac{1}{2\sqrt{t}}\,dt$

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

$= 2\cos u + C$

$= \boxed{2\cos\sqrt{t} + C}$

3. $\int_0^{\pi/4} \sec^2 x \tan^4 x\,dx$

$u = \tan x, \quad du = \sec^2 x\,dx$

$u(0) = \tan 0 = 0$

$u(\pi/4) = \tan \pi/4 = 1$

$= \int_0^1 u^4\,du$

$= \frac{1}{5}u^5\Big]_0^1$

$= \boxed{\frac{1}{5}}$

v1.1

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Name: Key	A#:	Section:

1. $\int (4-3x)^8\,dx$

$$\begin{cases} \text{let } u = 4-3x \\ du = -3\,dx \\ \frac{-du}{3} = dx \end{cases}$$

$$= -\frac{1}{3}\int u^8\,du$$

$$= -\frac{1}{3}\,\frac{u^9}{9} + C$$

$$= \frac{-1}{27}(4-3x)^9 + C$$

2. $\int \frac{e^t}{\sqrt{1+e^t}}\,dt$

$$\begin{cases} \text{let } u = 1+e^t \\ du = e^t dt \end{cases}$$

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

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

$$= 2\sqrt{1+e^t} + C$$

3. $\int_0^{\pi/4} \sin x \cos^3 x\,dx$

$$\begin{cases} \text{let } u = \cos x \\ du = -\sin x\,dx \\ -du = \sin x\,dx \end{cases}$$

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

$u(\pi/4) = \cos\frac{\pi}{4} = \frac{\sqrt{2}}{2}$

$$= -\int_1^{\sqrt{2}/2} u^3\,du$$

$$= -\left.\frac{u^4}{4}\right]_1^{\sqrt{2}/2}$$

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

$$= \frac{-1}{4}\left(\frac{4}{16} - 1\right) = \frac{-1}{4}\left(\frac{1}{4} - 1\right) = \frac{3}{16}$$

v1.2

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Name: SOLUTIONS	A#:	Section:

1. $\int \frac{dx}{\sqrt{3+2x}}$ let $u = 3+2x \Rightarrow du = 2\,dx$

$= \int \frac{du}{2\sqrt{u}}$

$= \sqrt{u} + C$

$= \sqrt{3+2x} + C$

2. $\int \frac{x^3}{1-3x^4}\,dx$ let $u = 1-3x^4 \Rightarrow du = -12x^3\,dx$

$= -\frac{1}{12}\int \frac{du}{u}$

$= -\frac{1}{12}\ln|u| + C = -\frac{1}{12}\ln|1-3x^4| + C$

3. $\int_0^{\pi/4} \cos x \sin^5 x\,dx$ let $u = \sin x \Rightarrow du = \cos x\,dx$

and $u(0) = \sin(0) = 0$

$u(\pi/4) = \sin(\pi/4) = 1/\sqrt{2}$

$= \int_0^{1/\sqrt{2}} u^5\,du$

$= \frac{1}{6}u^6\Big]_0^{1/\sqrt{2}}$

$= \frac{1}{6}\left(\left(\frac{1}{\sqrt{2}}\right)^6 - 0\right) = \frac{1}{48}$

v1.3