section (6.4) Using the Tables (end of book)
(We have to do a full substitution) (Must)

1. (1 pt) UNCC1242/EssentialCalculus-Stewart-Sec6.4.3.pg

Book Problem 3

Use the Table of Integrals in the back of your textbook to evaluate the integral.
Also specify the number of the formula used and the substitution made.

$\int 7\sec^3(3x)dx =$ ________________ $+C$,

using formula number ___ and the substitution $u =$ ______.

Let $u = 3x \Rightarrow du = 3dx$

$\int 7\sec^3(3x)dx = 7\int \sec^3 u \cdot \frac{du}{3}$

$= \frac{7}{3}\int \sec^3 u\,du$ $\boxed{\text{formula 71}}$

$= \frac{7}{3}\left[\frac{1}{2}\sec u\tan u + \frac{1}{2}\ln|\sec u + \tan u|\right] + C$

$= \boxed{\frac{7}{6}\sec(3x)\tan(3x) + \frac{7}{6}\ln|\sec(3x) + \tan(3x)| + C}$

2. (1 pt) UNCC1242/EssentialCalculus-Stewart-Sec6.4.5.pg

Book Problem 5

Use the Table of Integrals in the back of your textbook to evaluate the integral.

$\int \frac{13dx}{x^2\sqrt{4x^2+64}} =$ ________________ $+C$,

using formula number ___ and the substitution $u =$ ______.

$\int \frac{13dx}{x^2\sqrt{(2x)^2+8^2}}$, let $\boxed{u = 2x} \to du = 2dx$

$= \int \frac{13}{\left(\frac{u}{2}\right)^2\sqrt{u^2+8^2}} \cdot \frac{du}{2} = \frac{13}{\cancel{2}} \cdot 4 \int \frac{1}{u^2\sqrt{u^2+8^2}}du$ $\boxed{\text{Formula 28}}$

$= 26\left[-\frac{\sqrt{8^2+u^2}}{8^2(u)}\right] + C$

$= 26\left(\frac{-\sqrt{64+4x^2}}{64(2x)}\right) + C$

$= \boxed{\frac{-13\sqrt{64+4x^2}}{64x} + C}$

3. (1 pt) UNCC1242/EssentialCalculus-Stewart-Sec6.4.6.pg

Book Problem 6

Use the Table of Integrals in the back of your textbook to evaluate the integral.

$\int \frac{\sqrt{4y^2-13}}{y^2}dy =$ ________________ $+C$,

using formula number 42 and the substitution $u =$ 2y.

$\int \frac{\sqrt{u^2-13}}{\left(\frac{u}{2}\right)^2}\frac{du}{2} = \frac{4}{2}\int \frac{\sqrt{u^2-13}}{u^2}du = \ldots$

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4. (1 pt) UNCC1242/EssentialCalculus-Stewart-Sec6.4.9.pg

Book Problem 9

Let $u = \frac{4}{z} \Rightarrow du = -\frac{4}{z^2}dz \Rightarrow dz = \frac{z^2 du}{-4}$

$\int \frac{\tan^3(u)}{z^2} \cdot \frac{z^2 du}{-4} = -\frac{1}{4}\int \tan^3 u\, du = -\frac{1}{4}\left[\frac{1}{2}\tan^2 u + \ln|\cos u|\right] + C$

Use the Table of Integrals in the back of your textbook to evaluate the integral.

$\int \frac{\tan^3(4/z)}{z^2} dz = -\frac{1}{4}\left[\frac{1}{2}\tan^2\left(\frac{4}{z}\right) + \ln\left|\cos\left(\frac{4}{z}\right)\right|\right] + C$

using formula number 69 and the substitution $u =$ 4/z.

5. (1 pt) UNCC1242/EssentialCalculus-Stewart-Sec6.4.11.pg

Book Problem 11 like example 3 in the book

Use the Table of Integrals in the back of your textbook to evaluate the integral.

$\int y\sqrt{27+6y-y^2}\,dy =$ ______ $+C,$

using formula number 30 and the substitution $u =$ y−3.

$\int y\sqrt{27+6y-y^2}\,dy$

$= \int y\sqrt{27-(y^2-6y)}\,dy$

$= \int y\sqrt{27-(y^2-6y+9-9)}\,dy$

$= \int y\sqrt{27-(y-3)^2+9}\,dy$

$= \int y\sqrt{36-(y-3)^2}\,dy$ Let $u = y-3$, $du = dy$

$= \int (u+3)\sqrt{36-u^2}\,du$

$= \int u\sqrt{36-u^2}\,du + 3\int\sqrt{36-u^2}\,du$ $\boxed{30}$

Let $v = 36-u^2$, $dv = -2u\,du$

$= \int u\sqrt{v}\,\frac{dv}{-2u} + 3\left[\frac{u}{2}\sqrt{a^2-u^2} + \frac{a^2}{2}\sin^{-1}\frac{u}{a}\right] + C$

$= -\frac{1}{2}\int v^{1/2}dv + \frac{3u}{2}\sqrt{36-u^2} + \frac{3 \cdot 36}{2}\sin^{-1}\frac{u}{6} + C$

$= -\frac{1}{2}\cdot\frac{2}{3}v^{3/2}$ + =

$= -\frac{1}{3}(36-u^2)^{3/2} + \frac{3u}{2}\sqrt{36-u^2} + 54\sin^{-1}\frac{u}{6} + C$

$= \boxed{-\frac{1}{3}(36-(y-3)^2)^{3/2} + \frac{3(y-3)}{2}\sqrt{36-(y-3)^2} + 54\sin^{-1}\left(\frac{y-3}{6}\right) + C}$

6. (1 pt) UNCC1242/EssentialCalculus-Stewart-Sec6.4.14.pg

Book Problem 14

Use the Table of Integrals in the back of your textbook to evaluate the integral.

$\int \cos^4(6x)\,dx =$ ______ $+C,$

using formula number 74 and the substitution $u =$ 6x.

7. (1 pt) UNCC1242/EssentialCalculus-Stewart-Sec6.4.15.pg

Book Problem 15

Use the Table of Integrals in the back of your textbook to evaluate the integral.

$\int \frac{e^x}{16-e^{2x}}dx =$ ______ $+C,$

using formula number ___ and the substitution $u =$ ______.

Let $u = e^x \Rightarrow du = e^x dx$

$dx = \frac{du}{e^x}$

Formula 19

$\int \frac{e^x}{16-e^{2x}}dx = \int \frac{e^x}{16-u^2}\frac{du}{e^x} = \int \frac{du}{16-u^2} = \frac{1}{2a}\ln\left|\frac{u+a}{u-a}\right| + C$

$= \frac{1}{2(4)}\ln\left|\frac{u+4}{u-4}\right| + C = \boxed{\frac{1}{8}\ln\left|\frac{e^x+4}{e^x-4}\right| + C}$

8. (1 pt) UNCC1242/EssentialCalculus-Stewart-Sec6.4.17.pg

Book Problem 17

Use the Table of Integrals in the back of your textbook to evaluate the integral.

$\int \frac{x^7 dx}{\sqrt{x^{16}+42}} =$ ____________ $+C$,

using formula number 27 and the substitution $u =$ x^8.

let $u = x^8 \Rightarrow du = 8x^7 dx$

$$\int \frac{x^7 \cancel{dx}}{\sqrt{u^2+42}} \cdot \frac{du}{8x^7} = \frac{1}{8}\int \frac{du}{\sqrt{u^2+42}}$$

here $a = \sqrt{42}$

$$= \frac{1}{8}\left[\ln\left(u + \sqrt{42+u^2}\right)\right] + C$$

$$= \frac{1}{8}\ln\left(x^8 + \sqrt{42+x^{16}}\right) + C$$

9. (1 pt) UNCC1242/EssentialCalculus-Stewart-Sec6.4.21.pg

Book Problem 21

Use the Table of Integrals in the back of your textbook to evaluate the following indefinite integrals.

$\int \sqrt{e^{16x}-9}\, dx =$ ____________ $+C$,

using formula number 41 and the substitution $u =$ e^{8x}.

$u = e^{8x} \rightarrow du = 8e^{8x} dx$

$$\int \sqrt{u^2-9}\, \frac{du}{8e^{8x}} = \frac{1}{8}\int \frac{\sqrt{u^2-9}}{u} du$$

$= \ldots$

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10. (1 pt) UNCC1242/EssentialCalculus-Stewart-Sec6.4.Extra1.pg

Extra Problem

Use the Table of Integrals in the back of your textbook to evaluate the following indefinite integrals.

$\int \frac{7}{25x^2-40x+20} dx =$ ____________ $+C$,

using formula number ___ and the substitution $u =$ ______.

$$\cancel{= \frac{7}{5}\int \frac{1}{5x^2-8x+4} dx}$$

$$= \int \frac{7}{(25x^2-40x+16)-16+20} dx = \int \frac{7}{(5x-4)^2+4} dx$$

$(5x-4)^2$

$25x^2 - 2(5x)(4) + 16$

let $\boxed{u = 5x-4}$

$du = 5dx$

$$= \int \frac{7}{u^2+4} \cdot \frac{du}{5}$$

$$= \frac{7}{5}\int \frac{1}{u^2+4} du$$

$$= \frac{7}{5} \cdot \frac{1}{2} \tan^{-1}\left(\frac{u}{2}\right) + C$$

$$= \frac{7}{10} \tan^{-1}\left(\frac{5x-4}{2}\right) + C$$

$$\int \frac{du}{u^2+a^2} = \frac{1}{a}\tan^{-1}\left(\frac{u}{a}\right) + C$$

Formula $\boxed{17}$