PRINTABLE VERSION

Sol

Quiz 26

Question 1

Calculate: $\int \frac{1}{9(2+x)^2}\,dx$

a) $-\frac{1}{54(2+x)^2}+C$

b) $\frac{1}{18(2+x)^2}+C$

c) $-\frac{1}{18+9x}+C$

d) $-\frac{6}{9(2+x)^3}+C$

e) $-\frac{1}{6+3x}+C$

Let $u=2+x$, $du=dx$.

$=\int \frac{1}{9u^2}\,du$

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

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

$=-\frac{1}{18+9x}+C$.

Question 2

Calculate: $\int \frac{5x}{(x^2+5)^2}\,dx$

a) $-\frac{5}{x^2+5}+C$

b) $-\frac{5}{4x^2+20}+C$

Let $u=x^2+5$. $du=2x\,dx \Rightarrow \frac{du}{2}=x\,dx$

$=5\int \frac{x\,dx}{(x^2+5)^2}=5\int \frac{1}{u^2}\cdot\frac{du}{2}$

$=\frac{5}{2}\int \frac{du}{u^2}=\frac{5}{2}\cdot\left(-\frac{1}{u}\right)+C$.

$=-\frac{5}{2}\cdot\frac{1}{x^2+5}+C$.

$=-\frac{5}{2x^2+10}+C$.

c) $-\frac{5}{4(x^2+5)^2}+C$

d) $-\frac{5}{2x^2+10}+C$

e) $-\frac{1}{6(x^2+5)^3}+C$

Question 3

Calculate: $\int 3x^2\sqrt[4]{x^3+2}\,dx$

a) $\frac{4(x^3+2)^{9/4}}{3}+C$

b) $\frac{4(x^3+2)^{7/4}}{7}+C$

c) $\frac{12(x^3+2)^{5/4}}{5}+C$

d) $\frac{4(x^3+2)^{5/4}}{5}+C$

e) $\frac{12(x^3+2)^{7/4}}{7}+C$

Q3. Let $u=x^3+2$.

$du=3x^2dx$.

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

$=\frac{4}{5}u^{\frac{5}{4}}+C$.

$=\frac{4}{5}(x^3+2)^{\frac{5}{4}}+C$.

Question 4

Calculate: $\int \frac{10x+35}{\sqrt{x^2+7x-3}}\,dx$

Q4. Let $u=x^2+7x-3$.

$du=(2x+7)\,dx$

$=\int \frac{5(2x+7)\,dx}{\sqrt{x^2+7x-3}}$

$=5\int \frac{du}{\sqrt{u}}$

$=5\cdot\frac{u^{\frac{1}{2}}}{\frac{1}{2}}+C$.

$=10\cdot u^{\frac{1}{2}}+C$

$=10\cdot\sqrt{x^2+7x-3}+C$

a) $-10\sqrt{x^2+7x-3}+C$

b) $5\sqrt{x^2+7x-3}+C$

c) $10\sqrt{x^2+7x-3}+C$

d) $-2\sqrt{x^2+7x-3}+C$

e) $2\sqrt{x^2+7x-3}+C$

Question 5

Calculate: $\int_1^0 6x^2\left(2x^3+3\right)^2\,dx$

Q5. Let $u=2x^3+3$

$du=6x^2dx$

$\to \int_{2\cdot1^3+3}^{2\cdot0+3} u^2\,du$

$=\int_1^3 u^2\,du$

$=\frac{u^3}{3}\Big|_1^3=\frac{3^3-1^3}{3}=\frac{26}{3}$

a) $\frac{52}{3}$

b) $\frac{26}{3}$

c) $\frac{19}{3}$

d) $\frac{13}{6}$

e) $\frac{13}{3}$

Question 6

Calculate: $\int_0^a 10x\sqrt{a^2-x^2}\,dx$

Q6. Let $u=a^2-x^2$, $du=-2x\,dx$.

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

$\to 10\int_0^a x\sqrt{a^2-x^2}\,dx$

$=10\int_{a^2-0^2}^{a^2-a^2}\sqrt{u}\cdot\frac{du}{-2}$

$=\frac{10}{-2}\int_{a^2}^0\sqrt{u}\,du=-5\cdot\frac{u^{\frac{3}{2}}}{\frac{3}{2}}\Big|_{a^2}^0$

$=-\frac{10}{3}\left[0^{\frac{3}{2}}-(a^2)^{\frac{3}{2}}\right]=\frac{10}{3}a^3$

a) $10a^2$

b) $\frac{10a^3}{3}$

c) 0

d) $10a^3$

e) $\frac{10a^2}{3}$

Question 7

Calculate: $\int \cos(2x+3)\,dx$

Q7. Let $u=2x+3$, $\Rightarrow du=2dx$.

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

$\to \int \cos(u)\frac{du}{2}$

$=\frac{1}{2}\int\cos(u)\,du$

$=\frac{1}{2}\sin(u)+C$.

$=\frac{1}{2}\sin(2x+3)+C$.

a) $-\sin(2x+3)+C$

b) $\frac{1}{2}\sin(2x+3)+C$

c) $-\frac{1}{2}\sin(2x+3)+C$

d) $2\sin(2x+3)+C$

e) $-2\sin(2x+3)+C$

Question 8

Calculate: $\int \sec(2x+4)\tan(2x+4)\,dx$

Q8. Let $u=2x+4$, $du=2dx$

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

$=\int \sec(u)\tan(u)\cdot\frac{du}{2}$

$=\frac{1}{2}\int\sec(u)\tan(u)\,du$

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

$=\frac{1}{2}\sec(2x+4)+C$.

a) $\frac{1}{2}\sec(2x+4)\tan(2x+4)+C$

b) $\frac{1}{2}\sec(2x+4)+C$

c) $\frac{1}{2}\tan(2x+4)+C$

d) $2\tan(2x+4)+C$

e) $2\sec(2x+4)+C$

Let $u=\sin(x)$, $du=\cos(x)dx$

$=\int u^3\,du$.

$=\frac{u^4}{4}+C$

$=\frac{\sin^4(x)}{4}+C$

Question 9

Calculate: $\int \sin^3(x)\cos(x)\,dx$

a) $-\frac{1}{4}\sin^4(x)+C$

b) $\frac{1}{3}\sin^4(x)+C$

c) $\frac{1}{4}\sin^4(x)+C$

d) $-\frac{1}{3}\cos^4(x)+C$

e) $-\frac{1}{4}\cos^4(x)+C$

Let $u=3x^2+2$, $du=6x\,dx$

$\Rightarrow \frac{du}{6}=x\,dx$.

$=\int \frac{1}{u}\frac{du}{6}$

$=\frac{1}{6}\int\frac{du}{u}$

$=\frac{1}{6}\ln|u|+C$

$=\frac{1}{6}\ln|3x^2+2|+C$.

Question 10

Calculate: $\int \frac{x}{3x^2+2}\,dx$

a) $\frac{1}{6}\ln|3x^2+2|+C$

Q11.

b) $-\frac{x}{(3x^2+2)^2}+C$

c) $\frac{3}{2}\ln|3x^2+2|+C$

d) $\frac{1}{3}\ln|3x^2+2|+C$

e) $-\frac{x}{6(3x^2+2)^2}+C$

Let $u=5e^x$. $du=5e^x dx$

$\Rightarrow \frac{du}{5}=e^x dx$

$=\int \frac{e^x dx}{\sqrt{1-(5e^x)^2}}$

$=\int \frac{1}{\sqrt{1-(u)^2}}\frac{du}{5}$

$=\frac{1}{5}\int\frac{du}{\sqrt{1-u^2}}$

$=\frac{1}{5}\arcsin(u)+C$.

$=\frac{1}{5}\arcsin(5e^x)+C$

Question 11

Calculate: $\int \frac{e^x}{\sqrt{1-25e^{2x}}}dx$

a) $\frac{1}{5}\arctan(5e^x)+C$

b) $5\arctan(5e^x)+C$

c) $\frac{1}{5}\arcsin(5e^x)+C$

d) $5\arcsin(5e^x)+C$

e) $\frac{1}{10}\arcsin(5e^x)+C$