UNIVERSIDAD TECNOLÓGICA DE AGUASCALIENTES

ING. EN SISTEMAS Y DESARROLLO DE SOFTWARE

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MATERIA:

MATEMÁTICAS PARA INGENIERÍA

FECHA DE ENTREGA:

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Nombre:

Tema:

Día	Mes	Año	Folio

① $\int x \operatorname{sen}(x)^2\,dx$

$u = x^2$

$du = 2x$

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

$\int \operatorname{sen}(x^2)\,x\,dx = \int \operatorname{sen} u \cdot \frac{du}{2}$

$= \frac{1}{2}\int \operatorname{sen} u\,du = \frac{1}{2}\cdot(-\cos u) + C$

$= \frac{1}{2}\cos(x^2) + C$

⑨ $\int (1-2x)^9\,dx$

$u = 1-2x$

$du = -2$

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

$\int u^9\left(-\frac{du}{2}\right) = -\frac{1}{2}\int u^9\,du = \frac{1}{2}\left(\frac{u^{10}}{10}\right) + C$

$= \frac{-u^{10}}{20} + C$

⑩ $\int (x+1)\sqrt{2x+x^2}\,dx =$

$u = 2x + x^2$

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

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

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

$= \frac{1}{2}\left(\frac{u^{3/2}}{3/2}\right) + C = \frac{1}{2}\left(\frac{2}{3}u^{3/2}\right) + C$

$= \frac{\sqrt{u^3}}{3} + C = \frac{\sqrt{(2x+x^2)^3}}{3} + C$

⑬ $\int \frac{-dx}{5-3x} =$

$u = 5-3x$

$du = -3$

$\frac{-du}{5} = dx$

$\int \frac{1}{u}\left(\frac{du}{-3}\right) = -\frac{1}{3}\int \frac{1}{u}\,du = -\frac{1}{3}(\ln|u|) + C$

$= -\frac{1}{3}\ln|5-3x| + C$

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(15) $\int \operatorname{sen}(\pi t)\,dt$

$u = \pi t$

$du = \pi$

$\frac{du}{\pi} = dt$

$\int \operatorname{sen} u \frac{du}{\pi} = \frac{1}{\pi}\int \operatorname{sen} u\, du = \frac{1}{\pi}\cdot(-\cos u) + C = -\frac{\cos(\pi x)}{\pi} + C$

(17) $\int \frac{e^u}{(1-e^u)^2}\,du$

$u = 1 - e^u$

$du = -e^u$

$(1-e^u) = \frac{d}{du}(1) - \frac{d}{du}(e^u) = \int -e^u\,du = \int du = \left(-\frac{1}{e^u}\right)dx$

$= \int \frac{e^u}{x^2}\left(\frac{1}{e^u}\right)dx = \frac{e^u}{x^2}\left(-\frac{1}{e^u}\right) = -\frac{1}{x^2} = -\frac{e^u}{x^2} = \frac{1}{e^u}$

$= -\frac{1}{x^2} = \int -\frac{1}{x^2}\,dx = \int x^{-2}\,dx = -\left(-\frac{1}{1-e^u}\right)$

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

(19) $\int \frac{9+6x^2}{\sqrt{3ax+bx^3}}\,dx$

$u = 3ax + bx^3$

$du = 3a + 3bx^2$

$\int \frac{a+bx^2}{\sqrt{u}} \cdot \frac{1}{3a+3bx} = \frac{(a+bx^2)}{\sqrt{u}\cdot 3(a+bx^2)} = \frac{a+bx^2}{\sqrt{u}\cdot 3(a+bx^2)}$

$\int \frac{1}{3\sqrt{u}} = \frac{1}{3}\int \frac{1}{\sqrt{u}}\,du = \frac{1}{3}\int \frac{1}{u^{1/2}} = \frac{1}{3}\int u^{-1/2}$

$= \frac{1}{3}\int 2\,u^{1/2} = \frac{1}{3}\,2\,(3ax+bx^3)^{\frac{1}{2}} = \frac{2}{3}\sqrt{3ax+bx^3} + C$

(21) $\int (\ln x)^2\,dx = \int (\ln x)^2 \frac{1}{x}\,dx = \int u^2\,du = \frac{u^3}{3} + C$

$u = \ln$

$du = 1/x\,dx$

$du = 1/t\,dx$

$= \frac{(\ln x)^3}{3} + C$

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(25) $\int e^x \sqrt{1+e^x}\,dx = \int e^x \sqrt{u}\,\frac{1}{e^x}\,du = \int \sqrt{u}\,du = \int u^{1/2}\,du$

$= \int \frac{2}{3} u^{3/2} = \frac{2}{3}\sqrt{1+e^x}^3 + C$

(27) $\int (x^2+1)(x^3+3x)^4\,dx = \int (x^2+1)\,u^4\,\frac{1}{3x^2+3}\,du = \frac{1\cdot(x^2+1)}{3x+3} = \frac{u^4(x^2+1)}{3x^2+3}$

$u = x^3+3x$

$du = 3x^2+3$

$dx = \frac{1}{3x^2+3}dx$

$= \frac{(x^2+1)u^4}{3(x^3+1)} = \frac{u^4}{3} = \int \frac{u^4}{3}\,du \quad \frac{1}{3}\int u^4$

$= \frac{1}{3}\int \frac{u^5}{5} = \frac{1}{15}(x^3+3x)^5 + C$

(29) $\int 5^t \operatorname{sen}(5^t)\,dt = \int 5^t \ln(5)\,dt\,\frac{1}{5^t \ln(5)}\,du = \frac{\operatorname{sen}(u)}{\ln(5)}\,du$

$u = 5^t$

$du = 5$

$\frac{du}{5} = dt$

$= \int \frac{1}{\ln(5)} \cdot \int \frac{\operatorname{sen}(u)}{1}\,du = \frac{1}{\ln(5)}(-\cos(u)) =$

$= \frac{\cos(5^t)}{\ln(5)} + C$

(30) $\int \frac{x^3}{\sqrt{x^2+1}}\,dx$

$u = x^2+1$

$du = 2x$

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

$\int u^2 - 1\,du = \int \frac{x^3}{u} \cdot \frac{\sqrt{x^2+1}}{x}\,du = \frac{x^3}{u}\cdot\frac{u}{x} = x^2\,du$

$\int u^2 - 1\,du = \int \frac{u^3}{3} - u = \frac{(\sqrt{x^2+1})^3}{3} - \sqrt{x^2+1}$

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

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(31) $\int \frac{(x^2+1)(x^2-1)}{\sqrt[3]{x^2}}\,dx$

$(x^2+1)(x^2-1) = x^4 - 1$

$\int 3x^{\frac{1}{x^2}}\,d = \sqrt[3]{x} = 3\sqrt[3]{x}\,(x^2+1)(x^2-1) - 12\left(\frac{1}{4}x^{\frac{13}{3}} - \frac{1}{52}x\frac{13}{13}\right)$

$= \frac{1}{13} x \frac{13}{13} - 3\sqrt[3]{x} = \frac{3}{13} x \frac{13}{3} - 3\sqrt[3]{x} + C$

(32) $\int \frac{\ln(x^4)}{x}\,dx$

$\int \frac{\ln(u)}{4u}\,du = \frac{1}{4} \cdot \int \frac{\ln(u)}{u}\,du = \frac{1}{4} \cdot \int u\,du$

$= \frac{1}{4} \cdot \frac{u^2}{2} = \frac{1}{4} \cdot \frac{\ln^2(x^4)}{2} = \frac{1}{8}\ln^2(x^4) + C$