(7.3) A INTEGRAL DEFINIDA => PÁGINA 274 DO LIVRO MATEMÁTICA APLICADA À ECONOMIA E ADMINISTRAÇÃO (LOUIS LEITHOLD, EDITORA HARBRA)

EXERCÍCIOS (7.3)

(7) $\int_0^1 x^2\,dx$

$F(x) = \int x^2\,dx$

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

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

$\int_0^1 x^2\,dx = \frac{x^3}{3}\Big|_0^1$

$\int_0^1 x^2\,dx = \frac{(1)^3}{3} - \frac{(0)^3}{3}$

$\int_0^1 x^2\,dx = \frac{1}{3}$

(8) $\int_2^7 3x\,dx$

FORONI

|26|

$F(x) = \int 3x\,dx$

$F(x) = 3\int x\,dx$

$F(x) = 3\dfrac{x^{1+1}}{1+1} + C$

$F(x) = \dfrac{3}{2}x^2 + C$

$\int_2^7 3x\,dx = \dfrac{3}{2}x^2 \Big|_2^7$

$\int_2^7 3x\,dx = \dfrac{3}{2}(7)^2 - \dfrac{3}{2}(2)^2$

$\int_2^7 3x\,dx = \dfrac{3}{2}(49) - \dfrac{3}{2}(4)$

$\int_2^7 3x\,dx = \dfrac{147}{2} - \dfrac{12}{2}$

$\int_2^7 3x\,dx = \dfrac{135}{2}$

9 $\int_1^2 x^3\,dx$

$F(x) = \int x^3\,dx$

$F(x) = \dfrac{x^{3+1}}{3+1} + C$

$F(x) = \dfrac{x^4}{4} + C$

$\int_1^2 x^3\,dx = \dfrac{x^4}{4}\Big|_1^2$

$\int_1^2 x^3\,dx = \dfrac{(2)^4}{4} - \dfrac{(1)^4}{4}$

$\int_1^2 x^3\,dx = \dfrac{16}{4} - \dfrac{1}{4}$

$\int_1^2 x^3\,dx = \dfrac{15}{4}$

10 $\int_2^4 x^2\,dx$

$F(x) = \int x^2\,dx$

$F(x) = \dfrac{x^{2+1}}{2+1} + C$

$F(x) = \dfrac{x^3}{3} + C$

$\int_2^4 x^2\,dx = \dfrac{x^3}{3}\Big|_2^4$

$\int_2^4 x^2\,dx = \dfrac{(4)^3}{3} - \dfrac{(2)^3}{3}$

$\int_2^4 x^2\,dx = \dfrac{64}{3} - \dfrac{8}{3} = \dfrac{56}{3}$

FORONI

(11) $\int_1^4 (x^2+4x+5)\,dx$

$F(x)=\int (x^2+4x+5)\,dx$
$F(x)=\int x^2dx+\int 4x\,dx+\int 5\,dx$
$F(x)=\int x^2dx+4\int x\,dx+5\int dx$
$F(x)=\frac{x^{2+1}}{2+1}+4\frac{x^{1+1}}{1+1}+5x+C$
$F(x)=\frac{x^3}{3}+\frac{4.x^2}{2}+5x+C$
$F(x)=\frac{x^3}{3}+2x^2+5x+C$

$\int_1^4 (x^2+4x+5)\,dx=\frac{x^3}{3}+2x^2+5x\Big|_1^4$
$\int_1^4 (x^2+4x+5)\,dx=\frac{(4)^3}{3}+2(4)^2+5(4)-\left(\frac{(1)^3}{3}+2(1)^2+5(1)\right)$
$\int_1^4 (x^2+4x+5)\,dx=\frac{64}{3}+2(16)+20-\left(\frac{1}{3}+2(1)+5\right)$
$\int_1^4 (x^2+4x+5)\,dx=\frac{64}{3}+32+20-\left(\frac{1}{3}+2+5\right)$
$\int_1^4 (x^2+4x+5)\,dx=\frac{64}{3}+52-\frac{1}{3}-7$
$\int_1^4 (x^2+4x+5)\,dx=\frac{63}{3}+45$
$\int_1^4 (x^2+4x+5)\,dx=\frac{63+135}{3}=66$

(12) $\int_0^5 (x^3-1)\,dx$

$F(x)=\int (x^3-1)\,dx$
$F(x)=\int x^3dx-\int 1\,dx$
$F(x)=\int x^3dx-1\int dx$
$F(x)=\frac{x^{3+1}}{3+1}-x+C$
$F(x)=\frac{x^4}{4}-x+C$

$\int_0^5 (x^3-1)\,dx=\frac{x^4}{4}-x\Big|_0^5$
$\int_0^5 (x^3-1)\,dx=\frac{(5)^4}{4}-5-\left(\frac{(0)^4}{4}-0\right)$
$\int_0^5 (x^3-1)\,dx=\frac{625}{4}-5-0$
$\int_0^5 (x^3-1)\,dx=\frac{625-20}{4}=\frac{605}{4}$

(13) $\int_0^3 (3x^2-4x+1)\,dx$

1281

$F(x)=\int(3x^2-4x+1)\,dx$

$F(x)=\int 3x^2\,dx-\int 4x\,dx+\int 1\,dx$

$F(x)=3\int x^2\,dx-4\int x\,dx+1\int dx$

$F(x)=3\cdot\frac{x^{2+1}}{2+1}-4\,\frac{x^{1+1}}{1+1}+x+C$

$\rightarrow F(x)=\cancel{3}\,\frac{x^3}{\cancel{3}_1}-\overset{2}{\cancel{4}}\,\frac{x^2}{\cancel{2}_1}+x+C$

$F(x)=x^3-2x^2+x+C$

$\int_0^3(3x^2-4x+1)\,dx=x^3-2x^2+x\Big|_0^3$

$\int_0^3(3x^2-4x+1)\,dx=(3)^3-2(3)^2+3-((0)^3-2(0)^2+0)$

$\int_0^3(3x^2-4x+1)\,dx=27-2(9)+3-0$

$\int_0^3(3x^2-4x+1)\,dx=27-18+3=12$

14) $\int_0^4(x^3-x^2+1)\,dx$

$F(x)=\int(x^3-x^2+1)\,dx$

$F(x)=\int x^3\,dx-\int x^2\,dx+\int 1\,dx$

$F(x)=\int x^3\,dx-\int x^2\,dx+1\int dx$

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

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

$F(x)=\frac{x^4}{4}-\frac{x^3}{3}+x+C$

$\int_0^4(x^3-x^2+1)\,dx=\frac{x^4}{4}-\frac{x^3}{3}+x\Big|_0^4$

$\int_0^4(x^3-x^2+1)\,dx=\frac{(4)^4}{4}-\frac{(4)^3}{3}+4-\left(\frac{(0)^4}{4}-\frac{(0)^3}{3}+0\right)$

$\int_0^4(x^3-x^2+1)\,dx=\frac{256}{4}-\frac{64}{3}+4-0$

$\int_0^4(x^3-x^2+1)\,dx=\frac{768-256+48}{12}=\frac{\overset{140}{\cancel{560}}}{\cancel{12}_3}=\frac{140}{3}$

15) $\int_3^6(x^2-2x)\,dx$

$F(x)=\int (x^2-2x)\,dx$

$F(x)=\int x^2dx-\int 2x\,dx$

$F(x)=\int x^2dx-2\int x\,dx$

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

$F(x)=\frac{x^3}{3}-2\cdot\frac{x^2}{2}+C$

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

$\int_3^6 (x^2-2x)\,dx=\frac{x^3}{3}-x^2\Big|_3^6$

$\int_3^6 (x^2-2x)\,dx=\frac{(6)^3}{3}-(6)^2-\left(\frac{(3)^3}{3}-(3)^2\right)$

$\int_3^6 (x^2-2x)\,dx=\frac{216}{3}-36-\left(\frac{27}{3}-9\right)$

$\int_3^6 (x^2-2x)\,dx=\frac{216}{3}-36-\frac{27}{3}+9$

$\int_3^6 (x^2-2x)\,dx=\frac{189}{3}-27$

$\int_3^6 (x^2-2x)\,dx=63-27=36$

16 $\int_{-1}^3 (3x^2+5x-1)\,dx$

$F(x)=\int (3x^2+5x-1)\,dx$

$F(x)=\int 3x^2dx+\int 5x\,dx-\int 1dx$

$F(x)=3\int x^2dx+5\int x\,dx-1\int dx$

$F(x)=3\cdot\frac{x^{2+1}}{2+1}+5\cdot\frac{x^{1+1}}{1+1}-x+C$

$F(x)=3\cdot\frac{x^3}{3}+5\cdot\frac{x^2}{2}-x+C$

$F(x)=x^3+\frac{5}{2}x^2-x+C$

$\int_{-1}^3 (3x^2+5x-1)\,dx=x^3+\frac{5}{2}x^2-x\Big|_{-1}^3$

$\int_{-1}^3 (3x^2+5x-1)\,dx=(3)^3+\frac{5}{2}(3)^2-3-\left((-1)^3+\frac{5}{2}(-1)^2-(-1)\right)$

$$\int_{-1}^{3}(3x^2+5x-1)\,dx = 27+\frac{5}{2}(9)-3-\left(\cancel{-1}+\frac{5}{2}(1)\cancel{+1}\right)$$

$$\int_{-1}^{3}(3x^2+5x-1)\,dx = 24+\frac{45}{2}-\left(\frac{5}{2}\right)$$

$$\int_{-1}^{3}(3x^2+5x-1)\,dx = 24+\frac{45}{2}-\frac{5}{2}$$

$$\int_{-1}^{3}(3x^2+5x-1)\,dx = 24+\frac{\cancel{40}^{\,20}}{\cancel{2}_{\,1}}$$

$$\int_{-1}^{3}(3x^2+5x-1)\,dx = 24+20 = 44$$

17) $\displaystyle\int_{1}^{2}\frac{x^2+1}{x^2}\,dx$

$$F(x)=\int\frac{x^2+1}{x^2}\,dx$$

$$F(x)=\int\left(\frac{\cancel{x^2}^{\,1}}{\cancel{x^2}_{\,1}}+\frac{1}{x^2}\right)dx$$

$$F(x)=\int\left(1+\frac{1}{x^2}\right)dx \rightarrow F(x)=\int 1\,dx+\int\frac{1}{x^2}\,dx$$

$$F(x)=1\int dx+\int x^{-2}\,dx$$

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

$$F(x)=x+\frac{x^{-1}}{-1}+C \rightarrow F(x)=x-\frac{1}{x}+C$$

$$\int_{1}^{2}\frac{x^2+1}{x^2}\,dx = x-\frac{1}{x}\Big|_{1}^{2}$$

$$\int_{1}^{2}\frac{x^2+1}{x^2}\,dx = 2-\frac{1}{2}-\left(1-\frac{1}{1}\right)$$

$$\int_{1}^{2}\frac{x^2+1}{x^2}\,dx = \frac{4-1}{2}-(1-1)$$

$$\int_{1}^{2}\frac{x^2+1}{x^2}\,dx = \frac{3}{2}-0=\frac{3}{2}$$

(18) $\int_{-3}^{3}(y^3-4y)\,dy$

$F(x)=\int(y^3-4y)\,dy$

$F(x)=\int y^3\,dy-\int 4y\,dy$

$F(x)=\int y^3\,dy-4\int y\,dy$

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

$F(x)=\frac{y^4}{4}-\cancel{4}^{2}.\frac{y^2}{\cancel{2}_1}+C$

$F(x)=\frac{y^4}{4}-2y^2+C$

$\int_{-3}^{3}(y^3-4y)\,dy=\left.\frac{y^4}{4}-2y^2\right|_{-3}^{3}$

$\int_{-3}^{3}(y^3-4y)\,dy=\frac{(5)^4}{4}-2(5)^2-\left(\frac{(-3)^4}{4}-2(-3)^2\right)$

$\int_{-3}^{3}(y^3-4y)\,dy=\frac{625}{4}-2(25)-\left(\frac{81}{4}-2(9)\right)$

$\int_{-3}^{3}(y^3-4y)\,dy=\frac{625}{4}-30-\left(\frac{81}{4}-18\right)$

$\int_{-3}^{3}(y^3-4y)\,dy=\frac{625}{4}-30-\frac{81}{4}+18$

$\int_{-3}^{3}(y^3-4y)\,dy=\frac{544}{4}-32$

$\int_{-3}^{5}(y^3-4y)\,dy=136-32=104$

(19) $\int_{0}^{1}\frac{z}{(z^2+1)^3}\,dz$

$F(z)=\int\frac{z}{(z^2+1)^3}\,dz$ $\qquad u=z^2+1$ $\qquad \frac{du}{dz}=2z$

$F(z)=\int\frac{\frac{du}{2}}{u^3}$ $\qquad du=2z\,dz$

$z\,dz=\frac{du}{2}$

FORONI

|321|

$$F(z) = \int u^{-3} \frac{du}{2} \rightarrow F(z) = \frac{1}{2} \int u^{-3} du \rightarrow F(z) = \frac{1}{2} \frac{u^{-2}}{-2} + C$$

$$F(z) = \int \frac{1}{2} u^{-3} du \quad F(z) = \frac{1}{2} \frac{u^{-3+1}}{-3+1} + C \quad F(z) = -\frac{1}{4u^2} + C$$

$$F(z) = \frac{-1}{4(z^2+1)^2} + C$$

$$\int_0^1 \frac{z}{(z^2+1)^3} dz = \left. \frac{-1}{4(z^2+1)^2} \right|_0^1$$

$$\int_0^1 \frac{z}{(z^2+1)^3} dz = \frac{-1}{4((1)^2+1)^2} - \left(\frac{-1}{4((0)^2+1)^2} \right)$$

$$\int_0^1 \frac{z}{(z^2+1)^3} dz = \frac{-1}{4(1+1)^2} - \left(\frac{-1}{4(0+1)^2} \right)$$

$$\int_0^1 \frac{z}{(z^2+1)^3} dz = \frac{-1}{4(2)^2} - \left(\frac{-1}{4(1)^2} \right)$$

$$\int_0^1 \frac{z}{(z^2+1)^3} dz = \frac{-1}{4(4)} - \left(-\frac{1}{4(1)} \right)$$

$$\int_0^1 \frac{z}{(z^2+1)^3} dz = -\frac{1}{16} - \left(-\frac{1}{4} \right)$$

$$\int_0^1 \frac{z}{(z^2+1)^3} dz = -\frac{1}{16} + \frac{1}{4} = \frac{-1+4}{16} = \frac{3}{16}$$

20) $\int_1^4 \sqrt{x} (2+x) dx$

$$F(x) = \int \sqrt{x} (2+x) dx$$

$$F(x) = \int x^{1/2} (2+x) dx$$

$$F(x) = \int (2x^{1/2} + x^{3/2}) dx$$

$$F(x) = \int 2x^{1/2} dx + \int x^{3/2} dx$$

$$F(x) = 2 \int x^{1/2} dx + \int x^{3/2} dx$$

$$F(x) = 2 \frac{x^{1/2+1}}{1/2+1} + \frac{x^{3/2+1}}{3/2+1} + C$$

$$F(x) = 2 \frac{x^{3/2}}{3/2} + \frac{x^{5/2}}{5/2} + C$$

$$F(x) = 2 \cdot \frac{2}{3} x^{3/2} + \frac{2}{5} x^{5/2} + C$$

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

FORONI

$\int_1^4 \sqrt{x}(2+x)\,dx = \frac{4}{3}x^{3/2} + \frac{2}{5}x^{5/2} \Big|_1^4$

$\int_1^4 \sqrt{x}(2+x)\,dx = \frac{4}{3}(4)^{3/2} + \frac{2}{5}(4)^{5/2} - \left(\frac{4}{3}(1)^{3/2} + \frac{2}{5}(1)^{5/2}\right)$

$\int_1^4 \sqrt{x}(2+x)\,dx = \frac{4}{3}(8) + \frac{2}{5}(32) - \left(\frac{4}{3}(1) + \frac{2}{5}(1)\right)$

$\int_1^4 \sqrt{x}(2+x)\,dx = \frac{32}{3} + \frac{64}{5} - \frac{4}{3} - \frac{2}{5}$

$\int_1^4 \sqrt{x}(2+x)\,dx = \frac{28}{3} + \frac{62}{5}$

$\int_1^4 \sqrt{x}(2+x)\,dx = \frac{140+186}{15} = \frac{326}{15}$

28) $\int_1^{10} \sqrt{3x-1}\,dx$

$F(x) = \int \sqrt{3x-1}\,dx$ $\quad u = 3x-1 \quad \frac{du}{dx} = 3$

$F(x) = \int \sqrt{u}\,\frac{du}{3}$ $\quad du = 3\,dx$

$F(x) = \int \frac{1}{3} u^{1/2}\,du$ $\quad dx = \frac{du}{3}$

$F(x) = \frac{1}{3}\int u^{1/2}\,du$

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

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

$F(x) = \frac{1}{3}\cdot\frac{2}{3}u^{3/2} + C$

$F(x) = \frac{2}{15}u^{3/2} + C$

$F(x) = \frac{2}{15}(3x-1)^{3/2} + C$

|34|

$\int_1^{10} \sqrt{3x-1}\,dx = \frac{2}{15}(3x-1)^{3/2}\Big|_1^{10}$

$\int_1^{10} \sqrt{3x-1}\,dx = \frac{2}{15}(3(10)-1)^{3/2} - \left(\frac{2}{15}(3(1)-1)^{3/2}\right)$

$\int_1^{10} \sqrt{3x-1}\,dx = \frac{2}{15}(30-1)^{3/2} - \left(\frac{2}{15}(3-1)^{3/2}\right)$

$\int_1^{10} \sqrt{3x-1}\,dx = \frac{2}{15}(49)^{3/2} - \left(\frac{2}{15}(4)^{3/2}\right)$

$\int_1^{10} \sqrt{3x-1}\,dx = \frac{2}{15}(343) - \left(\frac{2}{15}(8)\right)$

$\int_1^{10} \sqrt{3x-1}\,dx = \frac{686}{15} - \frac{16}{15} = \frac{670}{15}$

22) $\int_0^{\sqrt{5}} t\sqrt{t^2+1}\,dt$

$F(t) = \int t\sqrt{t^2+1}\,dt$ $\qquad u = t^2+1 \qquad \frac{du}{dt} = 2t$

$F(t) = \int \sqrt{u}\,\frac{du}{2}$ $\qquad du = 2t\,dt$

$F(t) = \int \frac{1}{2} u^{1/2}\,du$ $\qquad t\,dt = \frac{du}{2}$

$F(t) = \frac{1}{2}\int u^{1/2}\,du$

$F(t) = \frac{1}{2}\frac{u^{1/2+1}}{1/2+1} + C$ $\qquad F(t) = \frac{1}{3}(t^2+1)^{3/2} + C$

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

$F(t) = \frac{1}{2}\cdot\frac{2}{3}u^{3/2} + C$

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

Foroni

$$\int_0^{\sqrt{5}} t\sqrt{t^2+1}\,dt = \frac{1}{3}(t^2+1)^{3/2}\Big|_0^{\sqrt{5}}$$

$$\int_0^{\sqrt{5}} t\sqrt{t^2+1}\,dt = \frac{1}{3}((\sqrt{5})^2+1)^{3/2} - \left(\frac{1}{3}((0)^2+1)^{3/2}\right)$$

$$\int_0^{\sqrt{5}} t\sqrt{t^2+1}\,dt = \frac{1}{3}(5+1)^{3/2} - \left(\frac{1}{3}(0+1)^{3/2}\right)$$

$$\int_0^{\sqrt{5}} t\sqrt{t^2+1}\,dt = \frac{1}{3}(6)^{3/2} - \left(\frac{1}{3}(1)^{3/2}\right)$$

$$\int_0^{\sqrt{5}} t\sqrt{t^2+1}\,dt = \frac{1}{3}\sqrt{6^3} - \left(\frac{1}{3}(1)\right)$$

$$\int_0^{\sqrt{5}} t\sqrt{t^2+1}\,dt = \frac{1}{3}\sqrt{6^2\cdot 6} - \frac{1}{3} = \frac{1}{3}6\sqrt{6} - \frac{1}{3} = \frac{1}{3}(6\sqrt{6}-1)$$

23 $\int_{-2}^{0} 3w\sqrt{4-w^2}\,dw$

$F(w) = \int 3w\sqrt{4-w^2}\,dw$ $\qquad u = 4-w^2 \quad \frac{du}{dw} = -2w$

$F(w) = 3\int w\sqrt{4-w^2}\,dw$

$F(w) = 3\int \sqrt{u}\,\frac{du}{-2}$ $\qquad du = -2w\,dw$

$\qquad w\,dw = \frac{du}{-2}$

$F(w) = 3\int -\frac{1}{2}u^{1/2}\,du$

$F(w) = 3\left(-\frac{1}{2}\right)\int u^{1/2}\,du$

$F(w) = -\frac{3}{2}\frac{u^{1/2+1}}{1/2+1} + C$

$F(w) = -\frac{3}{2}\cdot\frac{u^{3/2}}{3/2} + C$

$F(w) = -\frac{\cancel{3}^1}{_1\cancel{2}}\cdot\frac{\cancel{2}^1}{\cancel{3}_1}u^{3/2} + C$

$F(w) = -u^{3/2} + C$ $\qquad F(w) = -(4-w^2)^{3/2} + C$

1361

$$\int_{-2}^{0} 3w\sqrt{4-w^2}\,dw = -(4-w^2)^{3/2}\Big|_{-2}^{0}$$

$$\int_{-2}^{0} 3w\sqrt{4-w^2}\,dw = -(4-(0)^2)^{3/2} - \left(-(4-(-2)^2\right)^{3/2}$$

$$\int_{-2}^{0} 3w\sqrt{4-w^2}\,dw = -(4-0)^{3/2} - \left(-(4-(4))\right)^{3/2}$$

$$\int_{-2}^{0} 3w\sqrt{4-w^2}\,dw = -(4)^{3/2} - (-0)^{3/2}$$

$$\int_{-2}^{0} 3w\sqrt{4-w^2}\,dw = -\sqrt{4^3} = -\sqrt{2^2\,2} = -2\sqrt{2}$$

24) $$\int_{-1}^{3} \frac{dy}{(y+2)^3}$$

$$F(y) = \int \frac{dy}{(y+2)^3} \qquad u = y+2 \qquad \frac{du}{dy} = 1$$

$$F(y) = \int \frac{du}{u^3} \qquad du = dy$$

$$F(y) = \int u^{-3}\,du$$

$$F(y) = \frac{u^{-3+1}}{-3+1} + C$$

$$F(y) = \frac{u^{-2}}{-2} + C$$

$$F(y) = -\frac{1}{2u^2} + C \rightarrow F(y) = \frac{-1}{2(y+2)^2} + C$$

$$\int_{-1}^{3} \frac{dy}{(y+2)^3} = \frac{-1}{2(y+2)^2}\Big|_{-1}^{3}$$

$$\int_{-1}^{3} \frac{dy}{(y+2)^3} = \frac{-1}{2(3+2)^2} - \left(\frac{-1}{2(-1+2)^2}\right)$$

$$\int_{-1}^{3} \frac{dy}{(y+2)^3} = \frac{-1}{2(5)^2} - \left(\frac{-1}{2(1)^2}\right)$$

$$\int_{-1}^{3} \frac{dy}{(y+2)^3} = \frac{-1}{2(25)} - \left(\frac{-1}{2(1)}\right)$$

$$\int_{-1}^{3} \frac{dy}{(y+2)^3} = \frac{-1}{50} - \left(-\frac{1}{2}\right) = -\frac{1}{50} + \frac{1}{2} = \frac{-1+25}{50} = \frac{\cancel{24}^{\,12}}{\cancel{50}_{\,25}} = \frac{12}{25}$$

23) $\int_1^2 t^2\sqrt{t^3+1}\,dt$

$F(t)=\int t^2\sqrt{t^3+1}\,dt$ $\qquad u=t^3+1 \qquad \frac{du}{dt}=3t^2$

$F(t)=\int \sqrt{u}\,\frac{du}{3}$ $\qquad du=3t^2\,dt$

$F(t)=\int \frac{1}{3}u^{1/2}\,du$ $\qquad t^2\,dt=\frac{du}{3}$

$F(t)=\frac{1}{3}\int u^{1/2}\,du$

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

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

$F(t)=\frac{1}{3}\cdot\frac{2}{3}u^{3/2}+C$

$F(t)=\frac{2}{9}u^{3/2}+C$

$F(t)=\frac{2}{9}(t^3+1)^{3/2}+C$

$\int_1^2 t^2\sqrt{t^3+1}\,dt=\frac{2}{9}(t^3+1)^{3/2}\Big|_1^2$

$\int_1^2 t^2\sqrt{t^3+1}\,dt=\frac{2}{9}((2)^3+1)^{3/2}-\left(\frac{2}{9}((1)^3+1)^{3/2}\right)$

$\int_1^2 t^2\sqrt{t^3+1}\,dt=\frac{2}{9}(8+1)^{3/2}-\left(\frac{2}{9}(1+1)^{3/2}\right)$

$\int_1^2 t^2\sqrt{t^3+1}\,dt=\frac{2}{9}(9)^{3/2}-\left(\frac{2}{9}(2)^{3/2}\right)$

$\int_1^2 t^2\sqrt{t^3+1}\,dt=\frac{2}{9}\sqrt{9^3}-\frac{2}{9}\sqrt{2^3}$

$\int_1^2 t^2\sqrt{t^3+1}\,dt=\frac{2}{9}\sqrt{9^2\cdot 9}-\frac{2}{9}\sqrt{2^2\cdot 2}$

$\int_1^2 t^2\sqrt{t^3+1}\,dt=\frac{2}{9}\cdot 9\sqrt{9}-\frac{2}{9}\cdot 2\sqrt{2}=\frac{2}{9}(9\sqrt{9}-2\sqrt{2})=2\sqrt{9}-\frac{4}{9}\sqrt{2}$

FORONI

1381

26) $$\int_1^3 \frac{x\,dx}{(3x^2-1)^3}$$

$$F(x) = \int \frac{x\,dx}{(3x^2-1)^3} \qquad u = 3x^2-1 \qquad \frac{du}{dx} = 6x$$

$$du = 6x\,dx$$

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

$$F(x) = \int \frac{\frac{du}{6}}{u^3}$$

$$F(x) = \int u^{-3} \frac{du}{6}$$

$$F(x) = \int \frac{1}{6} u^{-3}\,du$$

$$F(x) = \frac{1}{6} \int u^{-3}\,du$$

$$F(x) = \frac{1}{6} \frac{u^{-3+1}}{-3+1} + C$$

$$F(x) = \frac{1}{6} \frac{u^{-2}}{-2} + C$$

$$F(x) = \frac{-1}{12} u^{-2} + C$$

$$F(x) = \frac{-1}{12u^2} + C$$

$$F(x) = \frac{-1}{12(3x^2-1)^2} + C$$

$$\int_1^3 \frac{x\,dx}{(3x^2-1)^3} = \frac{-1}{12(3x^2-1)^2} \Bigg|_1^3$$

$$\int_1^3 \frac{x\,dx}{(3x^2-1)^3} = \frac{-1}{12(3(3)^2-1)^2} - \left(\frac{-1}{12(3(1)^2-1)^2}\right)$$

$$\int_1^3 \frac{x\,dx}{(3x^2-1)^3} = \frac{-1}{12(3(9)-1)^2} - \left(\frac{-1}{12(3(1)-1)^2}\right)$$

$$\int_1^3 \frac{x\,dx}{(3x^2-1)^3} = \frac{-1}{12(27-1)^2} - \left(\frac{-1}{12(3-1)^2}\right)$$

$$\int_1^3 \frac{x\,dx}{(3x^2-1)^3} = \frac{-1}{12(26)^2} - \left(\frac{-1}{12(2)^2}\right)$$

$$\int_1^3 \frac{x\,dx}{(3x^2-1)^3} = \frac{-1}{12(676)} - \left(\frac{-1}{12(4)}\right)$$

$$\int_1^3 \frac{x\,dx}{(3x^2-1)^3} = \frac{-1}{8.112} - \left(\frac{-1}{48}\right) = \frac{-1}{8.112} + \frac{1}{48} = \frac{-1+169}{8.112} = \frac{\cancel{168}^{\,21}}{\cancel{8.112}_{\,1.014}} = \frac{\cancel{21}^{\,7}}{\cancel{1.014}_{\,338}} = \frac{7}{338}$$

FORONI

27 $\int_0^1 \frac{(y^2+2y)dy}{\sqrt[3]{y^3+3y^2+4}}$

$F(y) = \int \frac{(y^2+2y)dy}{\sqrt[3]{y^3+3y^2+4}}$ $\qquad u = y^3+3y^2+4 \qquad \frac{du}{dy} = 3y^2+6y$

$F(y) = \int \frac{\frac{du}{3}}{\sqrt[3]{u}}$ $\qquad \frac{du}{dy} = 3(y^2+2y)$

$F(y) = \int \frac{\frac{du}{3}}{u^{1/3}}$ $\qquad du = 3(y^2+2y)dy$

$(y^2+2y)dy = \frac{du}{3}$

$F(y) = \int u^{-1/3}\frac{du}{3}$

$F(y) = \int \frac{1}{3} u^{-1/3} du$

$F(y) = \frac{1}{3}\int u^{-1/3} du$

$F(y) = \frac{1}{3} \frac{u^{-1/3+1}}{-1/3+1} + C$

$\to F(y) = \frac{1}{3} \frac{u^{2/3}}{2/3} + C$

$F(y) = \frac{1}{\cancel{3}} \cdot \frac{\cancel{3}}{2} u^{2/3} + C$

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

$\to F(y) = \frac{1}{2}(y^3+3y^2+4)^{3/2} + C$

$\int_0^1 \frac{(y^2+2y)dy}{\sqrt[3]{y^3+3y^2+4}} = \frac{1}{2}(y^3+3y^2+4)^{3/2} \Big|_0^1$

$\int_0^1 \frac{(y^2+2y)dy}{\sqrt[3]{y^3+3y^2+4}} = \frac{1}{2}((1)^3+3(1)^2+4)^{3/2} - \left(\frac{1}{2}((0)^3+3(0)^2+4)^{3/2}\right)$

$\int_0^1 \frac{(y^2+2y)dy}{\sqrt[3]{y^3+3y^2+4}} = \frac{1}{2}(1+3(1)+4)^{3/2} - \left(\frac{1}{2}(0+3(0)+4)^{3/2}\right)$

$\int_0^1 \frac{(y^2+2y)dy}{\sqrt[3]{y^3+3y^2+4}} = \frac{1}{2}(5+3)^{3/2} - \left(\frac{1}{2}(4+0)^{3/2}\right)$

$\int_0^1 \frac{(y^2+2y)dy}{\sqrt[3]{y^3+3y^2+4}} = \frac{1}{2}(8)^{3/2} - \left(\frac{1}{2}(4)^{3/2}\right)$

$\int_0^1 \frac{(y^2+2y)dy}{\sqrt[3]{y^3+3y^2+4}} = \frac{1}{2}\sqrt{8^3} - \frac{1}{2}\sqrt{4^3} = \frac{1}{2}\sqrt{(2^3)^3} - \frac{1}{2}\sqrt{(2^2)^3} = \frac{1}{2}\sqrt{2^9} - \frac{1}{2}\sqrt{2^6}$ (*)

(*) $\frac{1}{2}\sqrt{2^8 \cdot 2} - \frac{1}{2}\cdot 2^3 = \frac{1}{2}\cdot 2^4\sqrt{2} - \frac{1}{2_1}\cdot 8^4 = \frac{1}{2_1}\cdot 16\sqrt{2} - 4 = 8\sqrt{2} - 4$

$4(2\sqrt{2}-1)$

1401

28) $\int_2^4 \frac{w^4 - w}{w^3}\, dw$

$F(w) = \int \frac{w^4 - w}{w^3}\, dw$

$F(w) = \int \left(\frac{w^4}{w^3} - \frac{w}{w^3}\right) dw$

$F(w) = \int \left(w - \frac{1}{w^2}\right) dw$

$F(w) = \int (w - w^{-2})\, dw$

$F(w) = \int w\, dw - \int w^{-2}\, dw$

$F(w) = \frac{w^{1+1}}{1+1} - \frac{w^{-2+1}}{-2+1} + C$

$F(w) = \frac{w^2}{2} - \frac{w^{-1}}{-1} + C$

$F(w) = \frac{w^2}{2} + w^{-1} + C$

$F(w) = \frac{w^2}{2} + \frac{1}{w} + C$

$\int_2^4 \frac{w^4 - w}{w^3}\, dw = \left.\frac{w^2}{2} + \frac{1}{w}\right|_2^4$

$\int_2^4 \frac{w^4 - w}{w^3}\, dw = \frac{(4)^2}{2} + \frac{1}{4} - \left(\frac{(2)^2}{2} + \frac{1}{2}\right)$

$\int_2^4 \frac{w^4 - w}{w^3}\, dw = \frac{16}{2} + \frac{1}{4} - \left(\frac{4}{2} + \frac{1}{2}\right)$

$\int_2^4 \frac{w^4 - w}{w^3}\, dw = \frac{16}{2} + \frac{1}{4} - \frac{4}{2} - \frac{1}{2}$

$\int_2^4 \frac{w^4 - w}{w^3}\, dw = \frac{11}{2} + \frac{1}{4} = \frac{22 + 1}{4} = \frac{23}{4}$

29) $\int_0^{15} \frac{w\, dw}{(1+w)^{3/4}}$

$F(w) = \int \frac{w\, dw}{(1+w)^{3/4}}$

$u = 1 + w \qquad \frac{du}{dw} = 1$

$w = u - 1 \qquad du = dw$

$F(w) = \int \frac{(u-1)\, du}{u^{3/4}}$

$F(w) = \int (u-1)u^{-3/4}\,du$

$F(w) = \int (u^{1/4} - u^{-3/4})\,du$

$F(w) = \int u^{1/4}\,du - \int u^{-3/4}\,du$

$F(w) = \frac{u^{1/4+1}}{1/4+1} - \frac{u^{-3/4+1}}{-3/4+1} + C$

$F(w) = \frac{u^{5/4}}{5/4} - \frac{u^{1/4}}{1/4} + C$

$\rightarrow F(w) = \frac{4}{5}u^{5/4} - 4u^{1/4} + C$

$F(w) = \frac{4}{5}(1+w)^{5/4} - 4(1+w)^{1/4} + C$

$\int_0^{15} \frac{w\,dw}{(1+w)^{3/4}} = \frac{4}{5}(1+w)^{5/4} - 4(1+w)^{1/4} \Big|_0^{15}$

$\int_0^{15} \frac{w\,dw}{(1+w)^{3/4}} = \frac{4}{5}(1+15)^{5/4} - 4(1+15)^{1/4} - \left(\frac{4}{5}(1+0)^{5/4} - 4(1+0)^{1/4}\right)$

$\int_0^{15} \frac{w\,dw}{(1+w)^{3/4}} = \frac{4}{5}(16)^{5/4} - 4(16)^{1/4} - \left(\frac{4}{5}(1)^{5/4} - 4(1)^{1/4}\right)$

$\int_0^{15} \frac{w\,dw}{(1+w)^{3/4}} = \frac{4}{5}\sqrt[4]{16^5} - 4\sqrt[4]{16} - \left(\frac{4}{5} - 4\right)$

$\int_0^{15} \frac{w\,dw}{(1+w)^{3/4}} = \frac{4}{5}\sqrt[4]{(2^4)^5} - 4\sqrt[4]{2^4} - \left(\frac{4}{5} - 4\right)$

$\int_0^{15} \frac{w\,dw}{(1+w)^{3/4}} = \frac{4}{5}\sqrt[4]{2^{20}} - 4(2) - \left(\frac{4}{5} - 4\right)$

$\int_0^{15} \frac{w\,dw}{(1+w)^{3/4}} = \frac{4}{5} \cdot 2^5 - 8 - \left(\frac{4}{5} - 4\right)$

$\int_0^{15} \frac{w\,dw}{(1+w)^{3/4}} = \frac{4}{5} \cdot 32 - 8 - \frac{4}{5} + 4$

$\int_0^{15} \frac{w\,dw}{(1+w)^{3/4}} = \frac{128}{5} - \frac{4}{5} - 4 = \frac{124}{5} - 4 = \frac{124 - 20}{5} = \frac{104}{5}$

30) $\int_4^5 x^2\sqrt{x-4}\,dx$

1421

$F(x) = \int x^2\sqrt{x-4}\,dx$ $\qquad u = x-4 \quad \frac{du}{dx} = 1$

$F(x) = \int (u+4)^2 \sqrt{u}\,du$ $\qquad x = u+4$

$F(x) = \int (u^2+8u+16)\,u^{1/2}\,du$ $\qquad du = dx$

$F(x) = \int (u^{5/2} + 8u^{3/2} + 16u^{1/2})\,du$

$F(x) = \int u^{5/2}du + \int 8u^{3/2}du + \int 16u^{1/2}du$

$F(x) = \int u^{5/2}du + 8\int u^{3/2}du + 16\int u^{1/2}du$

$F(x) = \frac{u^{5/2+1}}{5/2+1} + 8\frac{u^{3/2+1}}{3/2+1} + 16\frac{u^{1/2+1}}{1/2+1} + C$

$F(x) = \frac{u^{7/2}}{7/2} + 8\frac{u^{5/2}}{5/2} + 16\frac{u^{3/2}}{3/2} + C$

$F(x) = \frac{2}{7}u^{7/2} + 8\cdot\frac{2}{5}u^{5/2} + 16\cdot\frac{2}{3}u^{3/2} + C$

$F(x) = \frac{2}{7}u^{7/2} + \frac{16}{5}u^{5/2} + \frac{32}{3}u^{3/2} + C$

$F(x) = \frac{2}{7}(x-4)^{7/2} + \frac{16}{5}(x-4)^{5/2} + \frac{32}{3}(x-4)^{3/2} + C$

$\int_4^5 x^2\sqrt{x-4}\,dx = \frac{2}{7}(x-4)^{7/2} + \frac{16}{5}(x-4)^{5/2} + \frac{32}{3}(x-4)^{3/2}\Big|_4^5$

$\int_4^5 x^2\sqrt{x-4}\,dx = \frac{2}{7}(5-4)^{7/2} + \frac{16}{5}(5-4)^{5/2} + \frac{32}{3}(5-4)^{3/2} - \left(\frac{2}{7}(4-4)^{7/2} + \frac{16}{5}(4-4)^{5/2} + \frac{32}{3}(4-4)^{3/2}\right)$

$\int_4^5 x^2\sqrt{x-4}\,dx = \frac{2}{7}(1)^{7/2} + \frac{16}{5}(1)^{5/2} + \frac{32}{3}(1)^{3/2} - \left(\frac{2}{7}(0)^{7/2} + \frac{16}{5}(0)^{5/2} + \frac{32}{3}(0)^{3/2}\right)$

$\int_4^5 x^2\sqrt{x-4}\,dx = \frac{2}{7} + \frac{16}{5} + \frac{32}{3} - 0$

$\int_4^5 x^2\sqrt{x-4}\,dx = \frac{30+336+1.120}{105} = \frac{1.486}{105}$

31) $\int_0^3 (x+2)\sqrt{x+1}\,dx$

$F(x) = \int (x+2)\sqrt{x+1}\,dx$ $\qquad u = x+1 \quad \frac{du}{dx} = 1$

$F(x) = \int (u-1+2)\sqrt{u}\,du$ $\qquad x = u-1$

$F(x) = \int (u+1)\,u^{1/2}\,du$ $\qquad du = dx$

$F(x) = \int (u^{3/2} + u^{1/2})\,du$

1831

$F(x) = \int u^{3/2}\,du + \int u^{1/2}\,du$

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

$F(x) = \frac{u^{5/2}}{5/2} + \frac{u^{3/2}}{3/2} + C$

$F(x) = \frac{2}{5}u^{5/2} + \frac{2}{3}u^{3/2} + C$

$\rightarrow F(x) = \frac{2}{5}(x+1)^{5/2} + \frac{2}{3}(x+1)^{3/2} + C$

$\int_0^3 (x+2)\sqrt{x+1}\,dx = \frac{2}{5}(x+1)^{5/2} + \frac{2}{3}(x+1)^{3/2}\Big|_0^3$

$\int_0^3 (x+2)\sqrt{x+1}\,dx = \frac{2}{5}(3+1)^{5/2} + \frac{2}{3}(3+1)^{3/2} - \left(\frac{2}{5}(0+1)^{5/2} + \frac{2}{3}(0+1)^{3/2}\right)$

$\int_0^3 (x+2)\sqrt{x+1}\,dx = \frac{2}{5}(4)^{5/2} + \frac{2}{3}(4)^{3/2} - \left(\frac{2}{5}(1)^{5/2} + \frac{2}{3}(1)^{3/2}\right)$

$\int_0^3 (x+2)\sqrt{x+1}\,dx = \frac{2}{5}\sqrt{4^5} + \frac{2}{3}\sqrt{4^3} - \left(\frac{2}{5} + \frac{2}{3}\right)$

$\int_0^3 (x+2)\sqrt{x+1}\,dx = \frac{2}{5}\sqrt{(2^2)^5} + \frac{2}{3}\sqrt{(2^2)^3} - \left(\frac{2}{5} + \frac{2}{3}\right)$

$\int_0^3 (x+2)\sqrt{x+1}\,dx = \frac{2}{5}\sqrt{2^{10}} + \frac{2}{3}\sqrt{2^6} - \frac{2}{5} - \frac{2}{3}$

$\int_0^3 (x+2)\sqrt{x+1}\,dx = \frac{2}{5}(2^5) + \frac{2}{3}(2^3) - \frac{2}{5} - \frac{2}{3}$

$\int_0^3 (x+2)\sqrt{x+1}\,dx = \frac{2}{5}(32) + \frac{2}{3}(8) - \frac{2}{5} - \frac{2}{3}$

$\int_0^3 (x+2)\sqrt{x+1}\,dx = \frac{64}{5} + \frac{16}{3} - \frac{2}{5} - \frac{2}{3}$

$\int_0^3 (x+2)\sqrt{x+1}\,dx = \frac{62}{5} + \frac{14}{3} = \frac{186+70}{15} = \frac{256}{15}$

FORONI

1551

32 $\int_{-2}^{1} (x+1)\sqrt{x+3}\,dx$

$F(x) = \int (x+1)\sqrt{x+3}\,dx$ $\quad u = x+3 \quad \frac{du}{dx} = 1$

$F(x) = \int (u-3+1)\sqrt{u}\,du$ $\quad x = u-3$

$F(x) = \int (u-2)u^{1/2}\,du$ $\quad du = dx$

$F(x) = \int (u^{3/2} - 2u^{1/2})\,du$

$F(x) = \int u^{3/2}\,du - \int 2u^{1/2}\,du$

$F(x) = \int u^{3/2}\,du - 2\int u^{1/2}\,du$

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

$F(x) = \frac{u^{5/2}}{5/2} - 2\frac{u^{3/2}}{3/2} + C$

$F(x) = \frac{2}{5}u^{5/2} - 2\cdot\frac{2}{3}u^{3/2} + C$

$F(x) = \frac{2}{5}u^{5/2} - \frac{4}{3}u^{3/2} + C$

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

$\int_{-2}^{1} (x+1)\sqrt{x+3}\,dx = \frac{2}{5}(x+3)^{5/2} - \frac{4}{3}(x+3)^{3/2}\Big|_{-2}^{1}$

$\int_{-2}^{1} (x+1)\sqrt{x+3}\,dx = \frac{2}{5}(1+3)^{5/2} - \frac{4}{3}(1+3)^{3/2} - \left(\frac{2}{5}(-2+3)^{5/2} - \frac{4}{3}(-2+3)^{3/2}\right)$

$\int_{-2}^{1} (x+1)\sqrt{x+3}\,dx = \frac{2}{5}(4)^{5/2} - \frac{4}{3}(4)^{3/2} - \left(\frac{2}{5}(1)^{5/2} - \frac{4}{3}(1)^{3/2}\right)$

$\int_{-2}^{1} (x+1)\sqrt{x+3}\,dx = \frac{2}{5}\sqrt{4^5} - \frac{4}{3}\sqrt{4^3} - \left(\frac{2}{5} - \frac{4}{3}\right)$

$\int_{-2}^{1} (x+1)\sqrt{x+3}\,dx = \frac{2}{5}\sqrt{(2^2)^5} - \frac{4}{3}\sqrt{(2^2)^3} - \frac{2}{5} + \frac{4}{3}$

$\int_{-2}^{1} (x+1)\sqrt{x+3}\,dx = \frac{2}{5}\sqrt{2^{10}} - \frac{4}{3}\sqrt{2^6} - \frac{2}{5} + \frac{4}{3}$

$\int_{-2}^{1} (x+1)\sqrt{x+3}\,dx = \frac{2}{5}(2^5) - \frac{4}{3}(2^3) - \frac{2}{5} + \frac{4}{3}$

$\int_{-2}^{1} (x+1)\sqrt{x+3}\,dx = \frac{2}{5}(32) - \frac{4}{3}(8) - \frac{2}{5} + \frac{4}{3}$

$\int_{-2}^{1} (x+1)\sqrt{x+3}\,dx = \frac{64}{5} - \frac{32}{3} - \frac{2}{5} + \frac{4}{3} = \frac{62}{5} - \frac{28}{3} = \frac{186-140}{15} = \frac{46}{15}$

(33) $\int_1^{64}\left(\sqrt{t}-\frac{1}{\sqrt{t}}+\sqrt[3]{t}\right)dt$

$F(t)=\int\left(\sqrt{t}-\frac{1}{\sqrt{t}}+\sqrt[3]{t}\right)dt$

$F(t)=\int\sqrt{t}\,dt-\int\frac{1}{\sqrt{t}}\,dt+\int\sqrt[3]{t}\,dt$

$F(t)=\int t^{1/2}dt-\int\frac{1}{t^{1/2}}\,dt+\int t^{1/3}dt$

$F(t)=\int t^{1/2}dt-\int t^{-1/2}dt+\int t^{1/3}dt$

$F(t)=\frac{t^{1/2+1}}{1/2+1}-\frac{t^{-1/2+1}}{-1/2+1}+\frac{t^{1/3+1}}{1/3+1}+C$

$F(t)=\frac{t^{3/2}}{3/2}-\frac{t^{1/2}}{1/2}+\frac{t^{4/3}}{4/3}+C$

$F(t)=\frac{2}{3}t^{3/2}-2t^{1/2}+\frac{3}{4}t^{4/3}+C$

$\int_1^{64}\left(\sqrt{t}-\frac{1}{\sqrt{t}}+\sqrt[3]{t}\right)dt=\frac{2}{3}t^{3/2}-2t^{1/2}+\frac{3}{4}t^{4/3}\Big|_1^{64}$

$\int_1^{64}\left(\sqrt{t}-\frac{1}{\sqrt{t}}+\sqrt[3]{t}\right)dt=\frac{2}{3}(64)^{3/2}-2(64)^{1/2}+\frac{3}{4}(64)^{4/3}-\left(\frac{2}{3}(1)^{3/2}-2(1)^{1/2}+\frac{3}{4}(1)^{4/3}\right)$

$\int_1^{64}\left(\sqrt{t}-\frac{1}{\sqrt{t}}+\sqrt[3]{t}\right)dt=\frac{2}{3}\sqrt{64^3}-2\sqrt{64}+\frac{3}{4}\sqrt[3]{64^4}-\left(\frac{2}{3}-2+\frac{3}{4}\right)$

$\int_1^{64}\left(\sqrt{t}-\frac{1}{\sqrt{t}}+\sqrt[3]{t}\right)dt=\frac{2}{3}\sqrt{(8^2)^3}-2\sqrt{8^2}+\frac{3}{4}\sqrt[3]{(4^3)^4}-\left(\frac{2}{3}-2+\frac{3}{4}\right)$

$\int_1^{64}\left(\sqrt{t}-\frac{1}{\sqrt{t}}+\sqrt[3]{t}\right)dt=\frac{2}{3}\sqrt{8^6}-2(8)+\frac{3}{4}\sqrt[3]{4^{12}}-\left(\frac{2}{3}-2+\frac{3}{4}\right)$

$\int_1^{64}\left(\sqrt{t}-\frac{1}{\sqrt{t}}+\sqrt[3]{t}\right)dt=\frac{2}{3}(8^3)-16+\frac{3}{4}(4^4)-\left(\frac{2}{3}-2+\frac{3}{4}\right)$

$\int_1^{64}\left(\sqrt{t}-\frac{1}{\sqrt{t}}+\sqrt[3]{t}\right)dt=\frac{2}{3}(512)-16+\frac{3}{4}(256)-\frac{2}{3}+2-\frac{3}{4}$

1461

$$\int_1^{64}\left(\sqrt{t}-\frac{1}{\sqrt{t}}+\sqrt[3]{t}\right)dt=\frac{1.024}{3}-14+\frac{768}{4}-\frac{2}{3}-\frac{3}{4}$$

$$\int_1^{64}\left(\sqrt{t}-\frac{1}{\sqrt{t}}+\sqrt[3]{t}\right)dt=\frac{1.022}{3}-14+\frac{765}{4}=\frac{4.088-168+2295}{12}=\frac{6.215}{12}$$

34 $$\int_1^{4}\frac{x^5-x}{3x^3}\,dx$$

$$F(x)=\int\left(\frac{x^5-x}{3x^3}\right)dx$$

$$F(x)=\int\frac{1}{3}\left(\frac{x^5-x}{x^3}\right)dx$$

$$F(x)=\frac{1}{3}\int\left(\frac{x^5-x}{x^3}\right)dx$$

$$F(x)=\frac{1}{3}\int\left(\frac{\cancel{x^5}^{2}}{\cancel{x^3}}-\frac{x}{x^3}\right)dx$$

$$F(x)=\frac{1}{3}\int\left(x^2-x^{-2}\right)dx$$

$$F(x)=\frac{1}{3}\left(\int x^2\,dx-\int x^{-2}\,dx\right)$$

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

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

$$F(x)=\frac{1}{3}\left(\frac{x^3}{3}+\frac{1}{x}\right)+C$$

$$F(x)=\frac{x^3}{9}+\frac{1}{3x}+C$$

$$\int_1^{4}\frac{x^5-x}{3x^3}\,dx=\left.\frac{x^3}{9}+\frac{1}{3x}\right|_1^4$$

$$\int_1^{4}\frac{x^5-x}{3x^3}\,dx=\frac{(4)^3}{9}+\frac{1}{3(4)}-\left(\frac{(1)^3}{9}+\frac{1}{3(1)}\right)$$

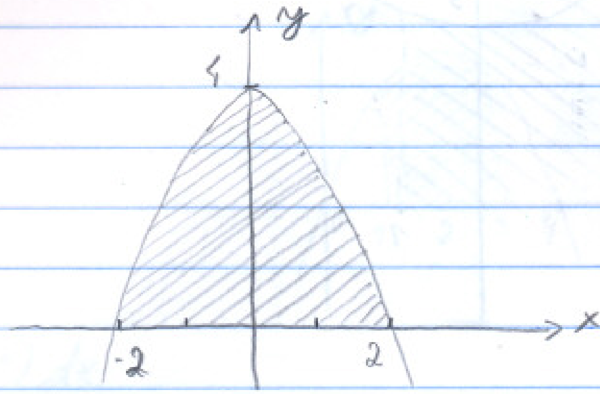
$$\int_1^{4}\frac{x^5-x}{3x^3}\,dx=\frac{64}{9}+\frac{1}{12}-\left(\frac{1}{9}+\frac{1}{3}\right)$$

$$\int_1^{4}\frac{x^5-x}{3x^3}\,dx=\frac{64}{9}+\frac{1}{12}-\frac{1}{9}-\frac{1}{3}$$

$$\int_1^{4}\frac{x^5-x}{3x^3}\,dx=\frac{\cancel{63}^{7}}{\cancel{9}_{1}}+\frac{1}{12}-\frac{1}{3}$$

$$\int_1^{4}\frac{x^5-x}{3x^3}\,dx=7+\frac{1}{12}-\frac{1}{3}=\frac{84+1-4}{12}=\frac{\cancel{81}^{27}}{\cancel{12}_{4}}=\frac{27}{4}$$

35) $y = 4 - x^2$, EIXO "x"



$$\int_{-2}^{2} (4 - x^2)\,dx$$

$F(x) = \int (4 - x^2)\,dx$

$F(x) = \int 4\,dx - \int x^2\,dx$

$F(x) = 4\int dx - \int x^2\,dx$

$F(x) = 4x - \dfrac{x^{2+1}}{2+1} + C$ $\rightarrow$ $F(x) = 4x - \dfrac{x^3}{3} + C$

$\int_{-2}^{2} (4 - x^2)\,dx = 4x - \dfrac{x^3}{3} \Big|_{-2}^{2}$

$\int_{-2}^{2} (4 - x^2)\,dx = 4(2) - \dfrac{(2)^3}{3} - \left(4(-2) - \dfrac{(-2)^3}{3}\right)$

$\int_{-2}^{2} (4 - x^2)\,dx = 8 - \dfrac{8}{3} - \left(-8 - \dfrac{(-8)}{3}\right)$

$\int_{-2}^{2} (4 - x^2)\,dx = 8 - \dfrac{8}{3} - \left(-8 + \dfrac{8}{3}\right)$

$\int_{-2}^{2} (4 - x^2)\,dx = 8 - \dfrac{8}{3} + 8 - \dfrac{8}{3} = 16 - \dfrac{16}{3} = \dfrac{48 - 16}{3} = \dfrac{32}{3}$

36) $y = x^2 - 2x + 3$, EIXO x ; $x = -2$ E $x = 1$

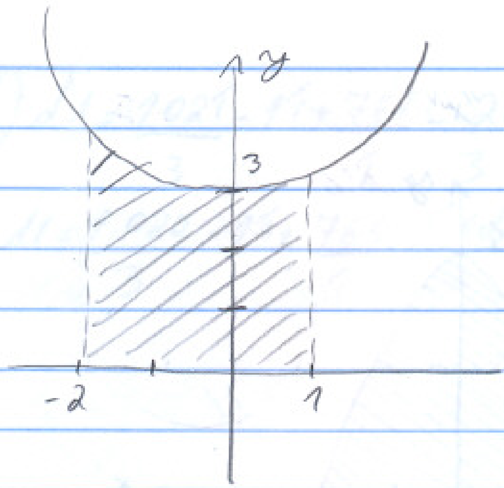
48

$\Delta = B^2 - 4AC$

$\Delta = (-2)^2 - 4(1)(3)$

$\Delta = 4 - 12$

$\Delta = -8$



$\int_{-2}^{1} (x^2 - 2x + 3)\,dx$

$F(x) = \int (x^2 - 2x + 3)\,dx$

$F(x) = \int x^2\,dx - \int 2x\,dx + \int 3\,dx$

$F(x) = \int x^2\,dx - 2\int x\,dx + 3\int dx$

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

$F(x) = \frac{x^3}{3} - \cancel{2}^{1} \cdot \frac{x^2}{\cancel{2}_1} + 3x + C$

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

$\int_{-2}^{1} (x^2 - 2x + 3)\,dx = \frac{x^3}{3} - x^2 + 3x \Big|_{-2}^{1}$

$\int_{-2}^{1} (x^2 - 2x + 3)\,dx = \frac{(1)^3}{3} - (1)^2 + 3(1) - \left(\frac{(-2)^3}{3} - (-2)^2 + 3(-2)\right)$

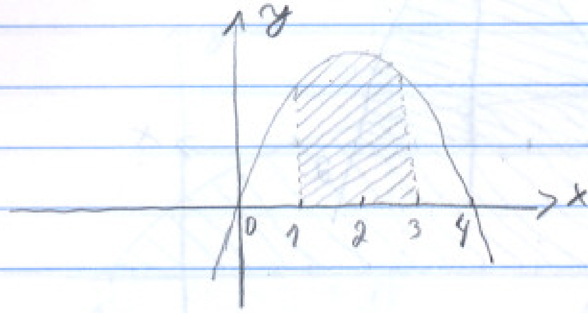
$\int_{-2}^{1} (x^2 - 2x + 3)\,dx = \frac{1}{3} - 1 + 3 - \left(-\frac{8}{3} - (4) - 6\right)$

$\int_{-2}^{1} (x^2 - 2x + 3)\,dx = \frac{1}{3} + 2 - \left(-\frac{8}{3} - 4 - 6\right)$

$\int_{-2}^{1} (x^2 - 2x + 3)\,dx = \frac{1}{3} + 2 - \left(-\frac{8}{3} - 10\right)$

$\int_{-2}^{1} (x^2 - 2x + 3)\,dx = \frac{1}{3} + 2 + \frac{8}{3} + 10 = \frac{\cancel{9}^{3}}{\cancel{3}_1} + 12 = 3 + 12 = 15$

(37) $y = 4x - x^2$; EIXO "x"; $x = 1$ E $x = 3$



$\int_1^3 (4x - x^2)\,dx$

$F(x) = \int (4x - x^2)\,dx$

$F(x) = \int 4x\,dx - \int x^2\,dx$

$F(x) = 4\int x\,dx - \int x^2\,dx$

$F(x) = 4\dfrac{x^{1+1}}{1+1} - \dfrac{x^{2+1}}{2+1} + C$

$F(x) = \cancel{4}^{2}\cdot\dfrac{x^2}{\cancel{2}_1} - \dfrac{x^3}{3} + C$

$F(x) = 2x^2 - \dfrac{x^3}{3} + C$

$\int_1^3 (4x - x^2)\,dx = 2x^2 - \dfrac{x^3}{3}\Big|_1^3$

$\int_1^3 (4x - x^2)\,dx = 2(3)^2 - \dfrac{(3)^3}{3} - \left(2(1)^2 - \dfrac{(1)^3}{3}\right)$

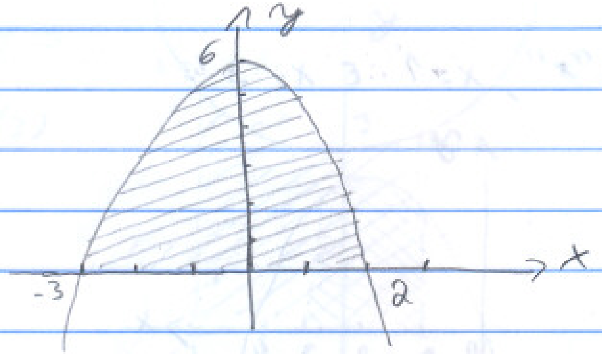
$\int_1^3 (4x - x^2)\,dx = 2(9) - \dfrac{\cancel{27}^{9}}{\cancel{3}_1} - \left(2(1) - \dfrac{1}{3}\right)$

$\int_1^3 (4x - x^2)\,dx = 18 - 9 - \left(2 - \dfrac{1}{3}\right)$

$\int_1^3 (4x - x^2)\,dx = 9 - 2 + \dfrac{1}{3} = 7 + \dfrac{1}{3} = \dfrac{21+1}{3} = \dfrac{22}{3}$

(38) $y = 6 - x - x^2$, EIXO X

1801



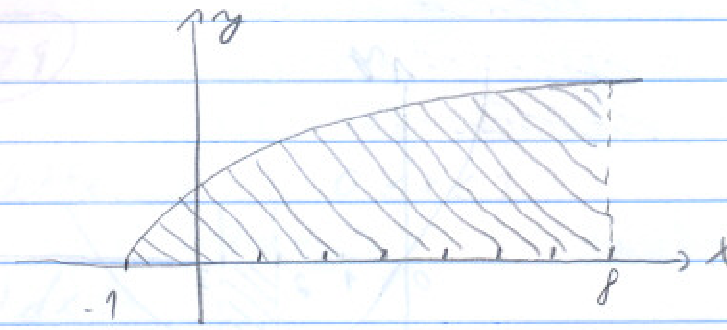
$$\int_{-3}^{2}(6-x-x^2)\,dx$$

$$F(x)=\int(6-x-x^2)\,dx$$
$$F(x)=\int 6\,dx-\int x\,dx-\int x^2\,dx$$
$$F(x)=6\int dx-\int x\,dx-\int x^2\,dx$$
$$F(x)=6x-\frac{x^{1+1}}{1+1}-\frac{x^{2+1}}{2+1}+C$$
$$F(x)=6x-\frac{x^2}{2}-\frac{x^3}{3}+C$$

$$\int_{-3}^{2}(6-x-x^2)\,dx=6x-\frac{x^2}{2}-\frac{x^3}{3}\Big|_{-3}^{2}$$
$$\int_{-3}^{2}(6-x-x^2)\,dx=6(2)-\frac{(2)^2}{2}-\frac{(2)^3}{3}-\left(6(-3)-\frac{(-3)^2}{2}-\frac{(-3)^3}{3}\right)$$
$$\int_{-3}^{2}(6-x-x^2)\,dx=12-\frac{4}{2}-\frac{8}{3}-\left(-18-\frac{9}{2}-\frac{(-27)}{3}\right)$$
$$\int_{-3}^{2}(6-x-x^2)\,dx=12-2-\frac{8}{3}-\left(-18-\frac{9}{2}+\frac{\cancel{27}^{9}}{\cancel{3}_{1}}\right)$$
$$\int_{-3}^{2}(6-x-x^2)\,dx=10-\frac{8}{3}-\left(-18-\frac{9}{2}+9\right)$$
$$\int_{-3}^{2}(6-x-x^2)\,dx=10-\frac{8}{3}-\left(-9-\frac{9}{2}\right)$$
$$\int_{-3}^{2}(6-x-x^2)\,dx=10-\frac{8}{3}+9+\frac{9}{2}=19-\frac{8}{3}+\frac{9}{2}=\frac{114-16+27}{6}=\frac{125}{6}$$

FORONI

(39) $y=\sqrt{x+1}$; Eixo "x" ; Eixo "y" , $x=8$



$\int_{-1}^{8} \sqrt{x+1}\, dx$

$F(x)=\int \sqrt{x+1}\, dx$ $\qquad u=x+1 \qquad \frac{du}{dx}=1$

$F(x)=\int \sqrt{u}\, du$

$F(x)=\int u^{1/2}\, du$ $\qquad du=dx$

$F(x)=\frac{u^{1/2+1}}{1/2+1}+C$ $\qquad F(x)=\frac{2}{3}u^{3/2}+C$

$F(x)=\frac{u^{3/2}}{3/2}+C$ $\qquad F(x)=\frac{2}{3}(x+1)^{3/2}+C$

$\int_{-1}^{8} \sqrt{x+1}\, dx=\frac{2}{3}(x+1)^{3/2}\Big|_{-1}^{8}$

$\int_{-1}^{8} \sqrt{x+1}\, dx=\frac{2}{3}(8+1)^{3/2}-\left(\frac{2}{3}(-1+1)^{3/2}\right)$

$\int_{-1}^{8} \sqrt{x+1}\, dx=\frac{2}{3}(9)^{3/2}-\left(\frac{2}{3}(0)^{3/2}\right)$

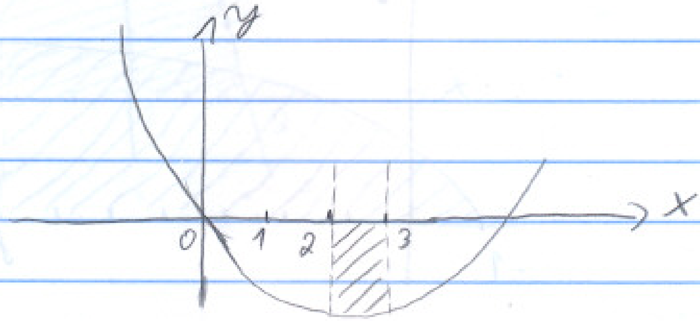
$\int_{-1}^{8} \sqrt{x+1}\, dx=\frac{2}{3}\sqrt{9^3}-0$

$\int_{-1}^{8} \sqrt{x+1}\, dx=\frac{2}{3}\sqrt{(3^2)^3}$

$\int_{-1}^{8} \sqrt{x+1}\, dx=\frac{2}{3}\sqrt{3^6}=\frac{2}{3}(3^3)=\frac{2}{\cancel{3}_1}(\cancel{27}^{9})=18$

1321

40 $y = \frac{1}{x^2} - x$; Eixo "x", $x=2$ e $x=3$



$$\int_2^3 \left(\frac{1}{x^2} - x\right) dx$$

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

$$F(x) = \int \frac{1}{x^2}\, dx - \int x\, dx$$

$$F(x) = \int x^{-2}\, dx - \int x\, dx$$

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

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

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

$$\int_2^3 \left(\frac{1}{x^2} - x\right) dx = -\frac{1}{x} - \frac{x^2}{2}\Big|_2^3$$

$$\int_2^3 \left(\frac{1}{x^2} - x\right) dx = -\frac{1}{3} - \frac{(3)^2}{2} - \left(-\frac{1}{2} - \frac{(2)^2}{2}\right)$$

$$\int_2^3 \left(\frac{1}{x^2} - x\right) dx = -\frac{1}{3} - \frac{9}{2} - \left(-\frac{1}{2} - \frac{4}{2}\right)$$

$$\int_2^3 \left(\frac{1}{x^2} - x\right) dx = -\frac{1}{3} - \frac{9}{2} - \left(-\frac{5}{2}\right)$$

$$\int_2^3 \left(\frac{1}{x^2} - x\right) dx = -\frac{1}{3} - \frac{9}{2} + \frac{5}{2} = -\frac{1}{3} - \frac{4}{2} = \frac{-2-12}{6} = -\frac{14}{6} = -\frac{7}{3}.$$