TALLER # 1
CALCULO INTEGRAL

1. $\int \sqrt{1-4y}\,dy$
2. $\int \sqrt[3]{3x-4}\,dx$
3. $\int x\sqrt[3]{x^2-9}\,dx$
4. $\int x(2x^2+1)^6\,dx$
5. $\int x^2(x^3-1)^{10}\,dx$
6. $\int 3x\sqrt{4-x^2}\,dx$
7. $\int \frac{y^3}{(1-2y^4)^5}\,dy$
8. $\int \frac{s}{\sqrt{3s^2+1}}\,ds$
9. $\int (x^2-4x+4)^{4/3}\,dx$
10. $\int x^4\sqrt{3x^5-5}\,dx$
11. $\int x\sqrt{x+2}\,dx$
12. $\int \frac{t}{\sqrt{t+3}}\,dt$
13. $\int \frac{2r}{(1-r)^7}\,dr$
14. $\int x^3(2-x^2)^{12}\,dx$
15. $\int \sqrt{3-2x}\,x^2\,dx$
16. $\int (x^3+3)^{1/4}x^5\,dx$
17. $\int \cos 4\theta\,d\theta$
18. $\int \operatorname{sen}\frac{1}{3}x\,dx$
19. $\int 6x^2 \operatorname{sen} x^3\,dx$
20. $\int \frac{1}{2}t\cos 4t^2\,dt$
21. $\int \sec^2 5x\,dx$
22. $\int \csc^2 2\theta\,d\theta$
23. $\int y\csc 3y^2\cot 3y^2\,dy$
24. $\int r^2\sec^2 r^3\,dr$
25. $\int \cos x(2+\operatorname{sen} x)^5\,dx$
26. $\int \frac{4\operatorname{sen} x}{(1+\cos x)^2}\,dx$
27. $\int \sqrt{1+\frac{1}{3x}}\,\frac{dx}{x^2}$
28. $\int \sqrt{\frac{1}{t}-1}\,\frac{dt}{t^2}$
29. $\int 2\operatorname{sen} x\sqrt[3]{1+\cos x}\,dx$
30. $\int \operatorname{sen} 2x\sqrt{2-\cos 2x}\,dx$
31. $\int \cos^2 t \operatorname{sen} t\,dt$
32. $\int \operatorname{sen}^3\theta\cos\theta\,d\theta$
33. $\int (\tan 2x+\cot 2x)^2\,dx$
34. $\int \frac{\sec^2 3\sqrt{t}}{\sqrt{t}}\,dt$
35. $\int \frac{x^2+2x}{\sqrt{x^3+3x^2+1}}\,dx$

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36. $\int x(x^2 + 1)\sqrt{4 - 2x^2 - x^4}\, dx$

37. $\int \frac{y + 3}{(3 - y)^{2/3}}\, dy$

38. $\int \sqrt{3 + s}\,(s + 1)^2\, ds$ **39.** $\int \frac{r^{1/3} + 2)^4}{\sqrt[3]{r^2}}\, dr$

40. $\int \left(t + \frac{1}{t}\right)^{3/2}\left(\frac{t^2 - 1}{t^2}\right) dt$

41. $\int \frac{x^3}{(x^2 + 4)^{3/2}}\, dx$ **42.** $\int \frac{x^3}{\sqrt{1 - 2x^2}}\, dx$

43. $\int \operatorname{sen} x \operatorname{sen}(\cos x)\, dx$

44. $\int \sec x \tan x \cos(\sec x)\, dx$

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Taller 2

1) $\int x e^{3x} dx$

$\int u\,du = uv - \int v\,du$

$u = x = du = dx$

$dv = e^{3x} = v = \frac{1}{3} e^{3x}$

$\int x e^{3x} dx = uv - \int v\,du$

$= x \cdot \frac{1}{3} e^{3x} - \int \frac{1}{3} e^{3x} dx$

$= \frac{1}{3} x e^{3x} - \frac{1}{3} \int e^{3x} dx$

$= \frac{1}{3} x e^{3x} - \frac{1}{3} \cdot \frac{1}{3} e^{3x}$

$= \frac{1}{3} x e^{3x} - \frac{1}{9} e^{3x} + C$

3)

$$\int x \sec(x) \tan(x)\, dx$$

$u = x = du = dx$

$dv = \sec(x)\tan(x)\, dx = v = \sec(x)$

$$= x \cdot \sec(x) - \int \sec(x) \cdot dx$$

$$= x \sec(x) - \int \sec(x)\, dx$$

$$= \int \sec(x)\, dx = \ln|\sec(x) + \tan(x)| + C$$

5) $\int \ln(5x)\, dx$

$$= \int \ln(5x)\, dx = \int (\ln(5) + \ln(x))\, dx = \ln(5) \cdot x +$$

$$\int \ln(x)\, dx$$

$u = \ln(x) \quad du = \frac{1}{x} dx$

$v = x \quad dv = dx$

$$\int \ln(x)\, dx = x \ln(x) - x + C$$

7) $\int \frac{(\ln(t))^2}{t}\,dt$

$u = \ln(t)\quad du = \frac{1}{t}\,dt$

$$\int \frac{\ln(t)^2}{t}\,dt = \int u^2\,du = \frac{u^3}{3} + C = \frac{(\ln(t))^3}{3} + C$$

9) $\int x \tan^{-1} x\,dx$

$u = \tan^{-1} x \quad du = \frac{1}{1+x^2}\,dx$

$dv = x\,dx \quad v = \frac{x^2}{2}$

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

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

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

$$= \frac{1}{2}(x - \tan^{-1} x)$$

$$\frac{x^2}{2}\tan^{-1} x - \frac{1}{2}\tan^{-1} x + C.$$

11) $\int \operatorname{sen}(\ln x)\,dy$

$u = \ln(y) \quad dy = ydy = e^u du$

$\int \sin(\ln y)dy = \int \sin(u)\cdot e^u du$

$u_1 = \sin(u) \quad du_1 = \cos(u)du$

$dv = e^u du \quad v = e^u$

$\frac{1}{2} e^{\ln y}(\sin(\ln y) - \cos(\ln y)) + C$

$= \frac{y}{2}(\sin(\ln y) - \cos(\ln y)) + C.$

13) $\int \frac{xe^{-x}}{(x+1)^2} dx$

$u = x+1 \quad x = u-1 \quad dx = du$

$\int \frac{(u-1)e^{-(u-1)}}{u^2} du = \int \frac{(u-1)e^{-1-u}}{u^2} du = e \cdot$

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

15) $\int e^x \cos(x)\, dx$

$$\int e^x \cos(x)\, dx = \frac{e^x(\cos(x)+\sin(x)}{2} + c$$

17) $\int \frac{x^3}{\sqrt{1-x^2}}\, dx$

$u = 1-x^2 \quad du = -2x\,dx \quad x^2 = 1-u,$

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

19) $\int x^2 \sin(h) x\, dx$

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

$du = \sin(h) x\, dx \quad v = \cos(h) x$

$$\int x^2 \sin(h) x\, dx = x^2 \cos(h) x - \int 2x \cos(h) x$$

$x^2 \cos(h) x - 2x \sin(h) x + 2\cos(h) + C.$

21) $\int \frac{\cot^{-1}\left(\frac{\sqrt{z}}{\sqrt{2}}\right)}{\sqrt{z}} dz$

$u = \frac{\sqrt{z}}{\sqrt{2}} \quad z = 2u^2, \; dz = 4u\,du$

$\frac{\cot^{-1}(u)}{\sqrt{z}} dz = \frac{\cot^{-1}(u)}{\sqrt{2}u} \cdot 4u\,du = \frac{4}{\sqrt{2}} \cot^{-1}(u)\,du$

$= 2\sqrt{2} \int \cot^{-1}(u) = 2\sqrt{2}\left(u \cot^{-1}(u) + \frac{1}{2} \ln(1+u^2)\right) + C$

$\sqrt{2}\left(\frac{\sqrt{z}}{\sqrt{2}} \cot^{-1} \frac{\sqrt{z}}{\sqrt{2}} + \frac{1}{2} \ln\left(1 + \frac{z}{2}\right)\right) + C.$

23) $\int \frac{\cos(x)}{\sqrt{x}} dx$

$u = \sqrt{x} \quad x = u^2, \; dx = 2u\,du$

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