**Cálculo B - Lista 2**

**Integração de funções trigonométricas envolvendo potências de tangente, secante, cotangente e cosecante**

Resolva cada uma das integrais a seguir

1. $\int \tan^2 5x \, dx$

2. $\int \cot^2 4t \, dt$

3. $\int x \cot^2 2x^2 \, dx$

4. $\int e^x \tan^2(e^x) \, dx$

5. $\int \cot^3 t \, dt$

6. $\int \tan^4 x \, dx$

7. $\int \tan^6 3x \, dx$

8. $\int \cot^5 2x \, dx$

9. $\int \sec^4 x \, dx$

10. $\int \csc^4 x \, dx$

11. $\int \csc^3 x \, dx$

12. $\int \sec^5 x \, dx$

13. $\int e^x \tan^4(e^x) \, dx$

14. $\int \frac{\sec^4(\ln x)}{x} \, dx$

15. $\int \tan^6 x \, \sec^4 x \, dx$

16. $\int \tan^5 x \, \sec^3 x \, dx$

17. $\int \cot^2 3x \, \csc^4 3x \, dx$

18. $\int (\sec 5x + \csc 5x)^2 \, dx$

19. $\int (\tan 2x + \cot 2x)^2 \, dx$

20. $\int \frac{1}{1+\cos x} \, dx$

21. $\int \frac{2\sin w - 1}{\cos^2 w} \, dw$

22. $\int \frac{\tan^3 \sqrt{x}}{\sqrt{x}} \, dx$

23. $\int \tan^5 3x \, dx$

24. $\int \frac{\tan^4 y}{\sec^5 y}\, dy$

25. $\int \frac{du}{1+\sec \frac{1}{2}u}$

26. $\int \frac{\csc^4 x}{\cot^2 x}\, dx$

27. $\int \frac{\sec^3 x}{\tan^4 x}\, dx$

28. $\int \frac{\sin^2 \pi x}{\cos^6 \pi x}\, dx$

29. $\int \frac{\tan^3(\ln x)\sec^6(\ln x)}{x}\, dx$

30. $\int \frac{\sec^4 w}{\sqrt{\tan w}}\, dw$

31. Mostre que $\int \cot x \; \csc^n x\, dx = -\frac{\csc^n x}{n} + C$ se $n \neq 0$.

32. Mostre que $\int \tan^n x\, dx = \frac{\tan^{n-1} x}{n-1} - \int \tan^{n-2} x\, dx$ se $n \geq 1, n \in N$.

33. Deduza uma fórmula similar aquela do exercício (31) para $\int \tan x \sec^n x\, dx$, se $n \neq 0$.

34. Deduza uma fórmula similar aquela do exercício (32) para $\int \cot^n x\, dx$, se $n \geq 1, n \in N$.

**Resposta**

1. $\frac{\tan 5x}{5} - x + C$

2. $-\frac{1}{4}\cot 4t - t + C$

3. $-\frac{1}{4}\cot 2x^2 - \frac{1}{2}x^2 + C$

4. $\tan e^x - e^x + C$

5. $-\frac{1}{2}\cot^2 t + \ln|\csc t| + C$

6. $\frac{1}{3}\tan^3 x - \tan x + x + C$

7. $\frac{1}{15}\tan^5 3x - \frac{1}{9}\tan^3 3x + \frac{1}{3}\tan 3x - x + C$

8. $-\frac{1}{8}\cot^4 2x + \frac{1}{4}\cot^2 2x + \frac{1}{2}\ln|\sin 2x| + C$

9. $\tan x + \frac{1}{3}\tan^3 x + C$

10. $-\cot x - \frac{1}{3}\cot^3 x + C$

11. $-\frac{1}{2}\csc x \cot x + \frac{1}{2}\ln|\csc x - \cot x| + C$

12. $\frac{1}{4}\sec^3 x \tan x + \frac{3}{8}\sec x \tan x + \frac{3}{8}\ln|\sec x + \tan x| + C$

13. $\frac{1}{3}\tan^3 e^x - \tan e^x + e^x + C$

14. $\tan \ln x + \frac{1}{3}\tan^3 \ln x + C$

15. $\frac{1}{7}\tan^7 x + \frac{1}{9}\tan^9 x + C$

16. $\frac{1}{7}\sec^7 x - \frac{2}{5}\sec^5 x + \frac{1}{3}\sec^3 x + C$

17. $-\frac{1}{15}\cot^5 3x - \frac{1}{9}\cot^3 3x + C$

18. $\frac{1}{5}\tan 5x - \frac{1}{5}\cot 5x + \frac{2}{5}\ln|\csc 10x - \cot 10x| + C$

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

20. $\tan\frac{x}{2} + C$

21. $2\sec w - \tan w + C$

22. $\tan^2\sqrt{x} - 2\ln|\sec\sqrt{x}| + C$

23. $\frac{1}{12}\tan^4 3x - \frac{1}{6}\tan^2 3x + \frac{1}{3}\ln|\sec 3x| + C$

24. $\frac{1}{5}\sin^5 y + C$

25. $2\left(\cot\frac{u}{2} - \csc\frac{u}{2}\right) + u + C$

26. $-2\cot 2x + C$

27. $-\frac{1}{3}\csc^3 x + C$

28. $\frac{1}{3\pi}\tan^3 \pi x + \frac{1}{5\pi}\tan^5 \pi x + C$

29. $\frac{1}{4}\tan^4 \ln x + \frac{1}{3}\tan^6 \ln x + \frac{1}{8}\tan^8 \ln x + C$

30. $2\sqrt{\tan w} + \frac{2}{5}\tan^{5/2} w + C$