

**Funções de Uma Variável II - Lista de Exercícios nº 2**  
**Aula 3**

**Observação.** Os exercícios indicados foram retirados do livro Calculus, volume 1, 7ª edição, editora Cengage Learning, de J. Stewart. Encontram-se no site [stewartcalculus.com](http://stewartcalculus.com) dicas (“homework hints”) para resolução dos exercícios numerados em vermelho.

**1–2** Evaluate the integral using integration by parts with the indicated choices of  $u$  and  $dv$ .

1.  $\int x^2 \ln x \, dx$ ;  $u = \ln x$ ,  $dv = x^2 \, dx$

2.  $\int \theta \cos \theta \, d\theta$ ;  $u = \theta$ ,  $dv = \cos \theta \, d\theta$

**3–36** Evaluate the integral.

3.  $\int x \cos 5x \, dx$

4.  $\int ye^{0.2y} \, dy$

5.  $\int te^{-3t} \, dt$

6.  $\int (x - 1) \sin \pi x \, dx$

7.  $\int (x^2 + 2x) \cos x \, dx$

8.  $\int t^2 \sin \beta t \, dt$

9.  $\int \ln \sqrt[3]{x} \, dx$

10.  $\int \sin^{-1} x \, dx$

11.  $\int \arctan 4t \, dt$

12.  $\int p^3 \ln p \, dp$

13.  $\int t \sec^2 2t \, dt$

14.  $\int s 2^s \, ds$

15.  $\int (\ln x)^2 \, dx$

16.  $\int t \sinh mt \, dt$

17.  $\int e^{2\theta} \sin 3\theta \, d\theta$

18.  $\int e^{-\theta} \cos 2\theta \, d\theta$

19.  $\int z^3 e^z \, dz$

20.  $\int x \tan^2 x \, dx$

21.  $\int \frac{x e^{2x}}{(1+2x)^2} \, dx$

22.  $\int (\arcsin x)^2 \, dx$

23.  $\int_0^{1/2} x \cos \pi x \, dx$

24.  $\int_0^1 (x^2 + 1) e^{-x} \, dx$

25.  $\int_0^1 t \cosh t \, dt$

26.  $\int_4^9 \frac{\ln y}{\sqrt{y}} \, dy$

27.  $\int_1^3 r^3 \ln r \, dr$

28.  $\int_0^{2\pi} t^2 \sin 2t \, dt$

29.  $\int_0^1 \frac{y}{e^{2y}} \, dy$

30.  $\int_1^{\sqrt{3}} \arctan(1/x) \, dx$

31.  $\int_0^{1/2} \cos^{-1} x \, dx$

32.  $\int_1^2 \frac{(\ln x)^2}{x^3} \, dx$

33.  $\int \cos x \ln(\sin x) \, dx$

34.  $\int_0^1 \frac{r^3}{\sqrt{4+r^2}} \, dr$

35.  $\int_1^2 x^4 (\ln x)^2 \, dx$

36.  $\int_0^t e^s \sin(t-s) \, ds$

**37–42** First make a substitution and then use integration by parts to evaluate the integral.

37.  $\int \cos \sqrt{x} \, dx$

38.  $\int t^3 e^{-t^2} \, dt$

39.  $\int_{\sqrt{\pi/2}}^{\sqrt{\pi}} \theta^3 \cos(\theta^2) \, d\theta$

40.  $\int_0^{\pi} e^{\cos t} \sin 2t \, dt$

41.  $\int x \ln(1+x) \, dx$

42.  $\int \sin(\ln x) \, dx$

1-49 Evaluate the integral.

1.  $\int \sin^2 x \cos^3 x \, dx$

3.  $\int_0^{\pi/2} \sin^7 \theta \cos^5 \theta \, d\theta$

5.  $\int \sin^2(\pi x) \cos^3(\pi x) \, dx$

7.  $\int_0^{\pi/2} \cos^2 \theta \, d\theta$

2.  $\int \sin^3 \theta \cos^4 \theta \, d\theta$

4.  $\int_0^{\pi/2} \sin^5 x \, dx$

6.  $\int \frac{\sin^3(\sqrt{x})}{\sqrt{x}} \, dx$

8.  $\int_0^{2\pi} \sin^2\left(\frac{t}{3}\right) \, d\theta$

17.  $\int \cos^2 x \tan^3 x \, dx$

19.  $\int \frac{\cos x + \sin 2x}{\sin x} \, dx$

21.  $\int \tan x \sec^3 x \, dx$

23.  $\int \tan^2 x \, dx$

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

27.  $\int_0^{\pi/3} \tan^5 x \sec^4 x \, dx$

29.  $\int \tan^3 x \sec x \, dx$

31.  $\int \tan^5 x \, dx$

33.  $\int x \sec x \tan x \, dx$

35.  $\int_{\pi/6}^{\pi/2} \cot^2 x \, dx$

37.  $\int_{\pi/4}^{\pi/2} \cot^5 \phi \csc^3 \phi \, d\phi$

39.  $\int \csc x \, dx$

41.  $\int \sin 8x \cos 5x \, dx$

43.  $\int \sin 5\theta \sin \theta \, d\theta$

9.  $\int_0^{\pi} \cos^4(2t) \, dt$

11.  $\int_0^{\pi/2} \sin^2 x \cos^2 x \, dx$

13.  $\int t \sin^2 t \, dt$

15.  $\int \frac{\cos^5 \alpha}{\sqrt{\sin \alpha}} \, d\alpha$

18.  $\int \cot^5 \theta \sin^4 \theta \, d\theta$

20.  $\int \cos^2 x \sin 2x \, dx$

22.  $\int \tan^2 \theta \sec^4 \theta \, d\theta$

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

26.  $\int_0^{\pi/4} \sec^4 \theta \tan^4 \theta \, d\theta$

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

30.  $\int_0^{\pi/4} \tan^4 t \, dt$

32.  $\int \tan^2 x \sec x \, dx$

34.  $\int \frac{\sin \phi}{\cos^3 \phi} \, d\phi$

36.  $\int_{\pi/4}^{\pi/2} \cot^3 x \, dx$

38.  $\int \csc^4 x \cot^6 x \, dx$

40.  $\int_{\pi/6}^{\pi/3} \csc^3 x \, dx$

42.  $\int \cos \pi x \cos 4\pi x \, dx$

44.  $\int \frac{\cos x + \sin x}{\sin 2x} \, dx$

10.  $\int_0^{\pi} \sin^2 t \cos^4 t \, dt$

12.  $\int_0^{\pi/2} (2 - \sin \theta)^2 \, d\theta$

14.  $\int \cos \theta \cos^2(\sin \theta) \, d\theta$

16.  $\int x \sin^3 x \, dx$

45.  $\int_0^{\pi/6} \sqrt{1 + \cos 2x} \, dx$

46.  $\int_0^{\pi/4} \sqrt{1 - \cos 4\theta} \, d\theta$

47.  $\int \frac{1 - \tan^2 x}{\sec^2 x} \, dx$

48.  $\int \frac{dx}{\cos x - 1}$

49.  $\int x \tan^2 x \, dx$

**1–3** Evaluate the integral using the indicated trigonometric substitution. Sketch and label the associated right triangle.

1.  $\int \frac{dx}{x^2 \sqrt{4 - x^2}} \quad x = 2 \sin \theta$

2.  $\int \frac{x^3}{\sqrt{x^2 + 4}} \, dx \quad x = 2 \tan \theta$

3.  $\int \frac{\sqrt{x^2 - 4}}{x} \, dx \quad x = 2 \sec \theta$

**4–30** Evaluate the integral.

4.  $\int_0^1 x^3 \sqrt{1 - x^2} \, dx$

5.  $\int_{\sqrt{2}}^2 \frac{1}{t^3 \sqrt{t^2 - 1}} \, dt$

6.  $\int_0^3 \frac{x}{\sqrt{36 - x^2}} \, dx$

7.  $\int_0^a \frac{dx}{(a^2 + x^2)^{3/2}}, \quad a > 0$

8.  $\int \frac{dt}{t^2 \sqrt{t^2 - 16}}$

9.  $\int \frac{dx}{\sqrt{x^2 + 16}}$

10.  $\int \frac{t^5}{\sqrt{t^2 + 2}} \, dt$

11.  $\int \sqrt{1 - 4x^2} \, dx$

12.  $\int \frac{du}{u \sqrt{5 - u^2}}$

13.  $\int \frac{\sqrt{x^2 - 9}}{x^3} \, dx$

14.  $\int_0^1 \frac{dx}{(x^2 + 1)^2}$

15.  $\int_0^a x^2 \sqrt{a^2 - x^2} \, dx$

16.  $\int_{\sqrt{2}/3}^{2/3} \frac{dx}{x^5 \sqrt{9x^2 - 1}}$

17.  $\int \frac{x}{\sqrt{x^2 - 7}} \, dx$

18.  $\int \frac{dx}{[(ax)^2 - b^2]^{3/2}}$

19.  $\int \frac{\sqrt{1 + x^2}}{x} \, dx$

20.  $\int \frac{x}{\sqrt{1 + x^2}} \, dx$

$$21. \int_0^{0.6} \frac{x^2}{\sqrt{9 - 25x^2}} dx$$

$$23. \int \sqrt{5 + 4x - x^2} dx$$

$$25. \int \frac{x}{\sqrt{x^2 + x + 1}} dx$$

$$27. \int \sqrt{x^2 + 2x} dx$$

$$29. \int x\sqrt{1 - x^4} dx$$

$$22. \int_0^1 \sqrt{x^2 + 1} dx$$

$$24. \int \frac{dt}{\sqrt{t^2 - 6t + 13}}$$

$$26. \int \frac{x^2}{(3 + 4x - 4x^2)^{3/2}} dx$$

$$28. \int \frac{x^2 + 1}{(x^2 - 2x + 2)^2} dx$$

$$30. \int_0^{\pi/2} \frac{\cos t}{\sqrt{1 + \sin^2 t}} dt$$