

## Lista de ejercicios de la lección 2.2

## Integrales Impropias

**Instrucciones.** Determinar si la integral converge o diverge, si converge calcule su valor.

$$1. \int_0^\infty \frac{x}{\left(1+x^2\right)^2} \, dx$$

1. 
$$\int_0^\infty \frac{x}{(1+x^2)^2} dx$$
 11.  $\int_{-\infty}^\infty \frac{x}{(x^2+9)^{\frac{3}{2}}} dx$ 

$$21. \int_0^\infty x e^{-x} dx$$

$$2. \int_0^\infty \frac{x}{1+x^2} \, dx$$

2. 
$$\int_{0}^{\infty} \frac{x}{1+x^2} dx$$
 12.  $\int_{1}^{\infty} \left(\frac{1}{x} - \frac{1}{x+1}\right) dx$  22.  $\int_{0}^{\infty} x^2 e^{-x} dx$ 

$$22. \int_0^\infty x^2 e^{-x} \, dx$$

$$3. \int_{4}^{\infty} \frac{x+18}{x^2+x-12} \, dx$$

3. 
$$\int_{4}^{\infty} \frac{x+18}{x^2+x-12} dx$$
 13.  $\int_{0}^{\infty} \frac{dx}{(1+x^2)(1+\tan^{-1}x)}$  23.  $\int_{-\infty}^{\infty} xe^{-x^2} dx$ 

$$23. \int_{-\infty}^{\infty} x e^{-x^2} dx$$

4. 
$$\int_{3}^{\infty} \frac{1}{x^2 - 1} dx$$
 14.  $\int_{0}^{\infty} \ln x dx$ 

$$14. \int_0^\infty \ln x \, dx$$

$$24. \int_{-\infty}^{\frac{\pi}{2}} \sin(2x) \, dx$$

$$5. \int_0^\infty \frac{1}{\sqrt[3]{x+1}} \, dx \qquad 15. \int_1^\infty \frac{\ln x}{x} \, dx$$

$$15. \int_{1}^{\infty} \frac{\ln x}{x} \, dx$$

$$25. \int_0^\infty e^{-x} \cos x \, dx$$

$$6. \int_{-\infty}^{0} \frac{dx}{\left(x-1\right)^3}$$

6. 
$$\int_{-\infty}^{0} \frac{dx}{(x-1)^3}$$
 16.  $\int_{4}^{\infty} \frac{1}{x (\ln x)^3} dx$ 

26. 
$$\int_{0}^{\infty} e^{-2x} \sin(3x) dx$$

7. 
$$\int_{-\infty}^{2} \frac{1}{x^2 + 4} dx$$
 17.  $\int_{-\infty}^{0} e^x dx$ 

$$17. \int_{-\infty}^{0} e^x \, dx$$

$$27. \int_{-\infty}^{\infty} \operatorname{sech}(x) \, dx$$

8. 
$$\int_{-\infty}^{0} \frac{1}{x^2 - 3x + 2} dx$$
 18.  $\int_{0}^{\infty} \frac{1}{e^x + e^{-x}} dx$ 

$$18. \int_0^\infty \frac{1}{e^x + e^{-x}} \, dx$$

$$9. \int_{-\infty}^{\infty} \frac{x \, dx}{x^4 + 9}$$

$$9. \int_{-\infty}^{\infty} \frac{x \, dx}{x^4 + 9}$$
 
$$19. \int_{0}^{\infty} \frac{e^x}{e^x + 1} \, dx$$

10. 
$$\int_{-\infty}^{\infty} \frac{2x}{(x^2+1)^2} dx$$
 20.  $\int_{-\infty}^{\infty} \frac{e^x dx}{e^{2x}+1}$ 

$$20. \int_{-\infty}^{\infty} \frac{e^x \, dx}{e^{2x} + 1}$$

Determine si las integrales dadas convergen o divergen.

28. 
$$\int_{0}^{2} \frac{dx}{1-x}$$

35. 
$$\int_0^1 \frac{e^{-\sqrt{x}}}{\sqrt{x}} dx$$

28. 
$$\int_0^2 \frac{dx}{1-x}$$
 35.  $\int_0^1 \frac{e^{-\sqrt{x}}}{\sqrt{x}} dx$  42.  $\int_0^\infty \frac{1}{\sqrt{x}(1+x)} dx$ 

$$29. \int_{-2}^{1} \frac{dx}{(x+1)^3}$$

$$36. \int_0^1 -\ln x \, dx$$

29. 
$$\int_{-2}^{1} \frac{dx}{(x+1)^3}$$
 36.  $\int_{0}^{1} -\ln x \, dx$  43.  $\int_{0}^{\infty} \frac{4}{\sqrt{x}(x+6)} \, dx$ 



$$30. \int_{-3}^{3} \frac{dx}{x^2 - x - 2}$$

$$37. \int_{\frac{1}{e}}^{e} \frac{1}{x(\ln x)^2} \, dx$$

$$30. \int_{-3}^{3} \frac{dx}{x^2 - x - 2} \qquad 37. \int_{1}^{e} \frac{1}{x(\ln x)^2} dx \qquad 44. \int_{2}^{\infty} \frac{1}{x\sqrt{x^2 - 4}} dx$$

$$31. \int_0^4 \frac{1}{x^2 - 4x + 3} dx \quad 38. \int_0^{\frac{\pi}{2}} \sec^2 x dx \qquad 45. \int_5^{\infty} \frac{1}{x\sqrt{x^2 - 25}} dx$$

$$38. \int_0^{\frac{\pi}{2}} \sec^2 x \, dx$$

$$45. \int_{5}^{\infty} \frac{1}{x\sqrt{x^2 - 25}} \, dx$$

$$32. \int_{-2}^{-1} \frac{1}{(x+2)^{\frac{5}{4}}} dx \qquad 39. \int_{0}^{\frac{\pi}{2}} \tan^{2}x dx \qquad 46. \int_{-1}^{1} \ln|x| dx$$

$$39. \int_0^{\frac{\pi}{2}} \tan^2 x \, dx$$

46. 
$$\int_{-1}^{1} \ln|x| \, dx$$

$$33. \int_{-2}^{3} \frac{x \, dx}{\sqrt{x^2 - 4}}$$

33. 
$$\int_{-2}^{3} \frac{x \, dx}{\sqrt{x^2 - 4}}$$
 40. 
$$\int_{\frac{\pi}{2}}^{\pi} \frac{1}{1 - \cos x} \, dx$$
 47. 
$$\int_{1}^{\infty} \frac{1}{x \ln x} \, dx$$

$$47. \int_{1}^{\infty} \frac{1}{x \ln x} \, dx$$

$$34. \int_{-2}^{2} \frac{x}{x^2 - 1} \, dx$$

$$34. \int_{-2}^{2} \frac{x}{x^{2} - 1} dx \qquad 41. \int_{-1}^{\infty} \frac{dx}{x^{2} + 5x + 6} \quad 48. \int_{-\infty}^{-2} \frac{2 dx}{x^{2} - 1}$$

48. 
$$\int_{-\infty}^{-2} \frac{2 \, dx}{x^2 - 1}$$