

Derivatives of Exponential Functions

Find the derivatives of the following functions:

1. $y = e^{7x}$

2. $y = e^{-5x^2}$

3. $y = e^{1/x}$

4. $y = x^3 e^x$

5. $y = \sin(e^x)$

6. $y = \frac{e^x - e^{-x}}{e^x + e^{-x}}$

7. $y = \frac{e^x}{\ln x}$

8. $y = e^{\sqrt{1+5x^3}}$

9. $y = e^{x-e^{3x}}$

10. $y = \ln(\sin e^x)$ (do later)

11. $y = \ln(1 - xe^{-x})$ (do later)

12. $y = \sqrt{1+e^x}$

13. $y = \ln(e^{2x})$

14. $y = e^{\ln(x^2)}$

15. $y = e^{\ln(x^3+1)}$

16. $y = e^{\sin x}$

17. $y = 2^x$

18. $y = 3^{-x}$

19. $y = \pi^{\sin x}$

20. $y = (\sqrt{2})^{x \ln x}$

Integrals of e to the u

1. $\int \frac{dx}{e^x}$

2. $\int e^{-5x} dx$

3. $\int e^{\sin x} \cos x dx$

4. $\int x^3 e^{x^4} dx$

5. $\int x^2 e^{-2x^3} dx$

6. $\int \frac{e^x}{1+e^x} dx$

7. $\int \sqrt{e^x} dx$

8. $\int e^{2t} \sqrt{1+e^{2t}} dt$

9. $\int 2^{5x} dx$

10. $\int \pi^{\sin x} \cos x dx$

11. $\int_0^{\ln 2} e^{-3x} dx$

12. $\int_0^{\ln 5} e^x (3-4e^x) dx$

13. $\int_1^{\sqrt{2}} x 4^{-x^2} dx$

14. $\int_1^2 (3-e^x) dx$

Derivatives of Exponential Functions: KEY

1. $7e^{7x}$

2. $-10xe^{-5x^2}$

3. $-\frac{1}{x^2}e^{1/x}$

4. $3x^2e^x + x^3e^x$

5. $e^x \cos(e^x)$

6. $\frac{4e^{2x}}{(e^{2x} + 1)^2}$

7. $\frac{xe^x \ln x - e^x}{x(\ln x)^2}$

8. $\frac{15x^2 e^{\sqrt{1+5x^3}}}{2\sqrt{1+5x^3}}$

9. $(e^{x-e^{3x}})(1-3e^{3x})$

10. $\frac{\cos(e^x)}{\sin(e^x)} \cdot e^x$

11. $\frac{-1+x}{e^x - x}$

12. $\frac{e^x}{2\sqrt{1+e^x}}$

13. 2

14. $2x$

15. $3x^2$

16. $\cos x e^{\sin x}$

17. $2^x \ln 2$

18. $-3^{-x} \ln 3$

19. $\pi^{\sin x} \cdot \ln \pi \cdot \cos x$

20. $\sqrt{2}^{x \ln x} \cdot \ln \sqrt{2} \cdot (\ln x + 1)$

Integrals of e to the u: KEY

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

2. $-\frac{1}{5}e^{-5x} + C$

3. $e^{\sin x} + C$

4. $\frac{1}{4}e^{x^4} + C$

5. $-\frac{1}{6}e^{-2x^3} + C$

6. $\ln(1+e^x) + C$

7. $2\sqrt{e^x} + C$

8. $\frac{1}{3}(1+e^{2x})^{3/2} + C$

9. $\frac{2^{5x}}{5 \ln 2} + C$

10. $\frac{\pi^{\sin x}}{\ln \pi} + C$

11. $\frac{7}{24}$

12. -36

13. $\frac{3}{32 \ln 4} \approx .0676$

14. $3 - e^2 + e \approx -1.6708$