

The exponential function
Show work on your own paper!

Find the derivative of each.

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

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

3. $g(t) = e^{-3/t^2}$

4. $y = \ln e^x$

5. $y = \ln\left(\frac{1+e^x}{1-e^x}\right)$

Solve each. Round to decimals as necessary.

6. $200e^{-4x} = 15$

7. $9 - 2e^x = 7$

8. $\ln(x-2)^2 = 12$

Find the integral.

9. $\int e^{-x^4} (-4x^3) dx$

11. $\int \frac{e^{1/x^2}}{x^3} dx$

13. $\int_{-2}^0 x^2 e^{x^3/2} dx$

10. $\int \frac{e^{2x}}{1+e^{2x}} dx$

12. $\int_3^4 e^{3-x} dx$

14. $\int_0^{\sqrt{2}} x e^{-x^2/2} dx$

MISC

Find the equation of the tangent line through the given point.

15. $y = e^{-2x+x^2}$; (2,1)

16. $y = x^2 e^x - 2x e^x + 2e^x$; (1,e)

17. Use IMPLICIT DIFFERENTIATION to find dy/dx for $x e^y - 10x + 3y = 0$.

Recall

18. MULTIPLE CHOICE: Let g be the function defined by $g(x) = x^3 + x$. If $f(x) = g^{-1}(x)$ and $f(2) = 1$, what is the value of $f'(2)$?

a. $1/13$

c. $7/4$

e. 13

b. $1/4$

d. 4

19. Integrate: $\int_1^2 \frac{2-x}{x} dx$

20. Find the derivative of $f(x) = \frac{\ln 2x}{x^3}$

ANSWERS

1. $-2xe^{-x^2}$

2. $xe^{-x}(2-x)$

3. $\frac{6e^{-3/t^2}}{t^3}$

4. 1

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

6. 0.648

7. 0

8. 405.429

9. $e^{-x^4} + C$

10. $\frac{1}{2} \ln(1+e^{2x}) + C$

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

12. $1 - \frac{1}{e}$

13. $\frac{2}{3} \left(1 - \frac{1}{e^4}\right)$

14. $\frac{e-1}{e}$

15. $y-1=2(x-2)$

16. $y-e=e(x-1)$

17. $\frac{dy}{dx} = \frac{10-e^y}{xe^y+3}$

18. B

19. $\ln 4 - 1$

20. $\frac{1-3\ln 2x}{x^4}$