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Find dy/dx for each of the following functions.

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

2. $y = 4^{-3x}$

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

4. $y = 5^{x^3}$

5. $y = x^3 e^{2x}$

6. $y = e^x \sec x$

7. $y = \ln|3x|$

8. $y = \ln|\csc x|$

9. $y = \ln|x^3 + 1|$

10. $y = \text{Log}|3x + 1|$

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Integrate each of the following.

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

12. $\int 2^x dx =$

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

14. $\int e^x \cos(e^x) dx =$

15. $\int \frac{dx}{3x+1} =$

16. $\int \frac{x dx}{x^2+1} =$

17. $\int \frac{x+1}{x-1} dx =$

18. $\int \cot x dx =$

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Integrate and evaluate each of the following. (Please give the exact value in simplest form.)

19. $\int_0^2 e^x dx =$

20. $\int_1^4 e^{-2x} dx =$

21. $\int_1^4 \frac{dx}{x} =$

22. $\int_1^5 \frac{dx}{3x+1} =$

Answer the following questions. Show your work neatly organized. Express your answers rounded to three significant digits.

23. Find the equations of the lines that are tangent and normal to the graph of $f(x) = \ln(x^2) + 1$ at the point on the graph where $x = -1$.

tangent :

normal:

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Answer the following questions. Show your work neatly organized. Express your answers rounded to three significant digits.

24. What is the area of the region bounded by the x-axis, the lines $x = \pi/6$ and $x = \pi/3$ and the graph of $y = \tan x$?

25. What is the volume of the solid formed when the region bounded by the x-axis, the lines $x = 1$ and $x = 6$, and the curve $y = 2^{0.05x}$ is rotated about the x-axis?

26. What is the average value of the function $y = \sec x$ over the interval $[-\pi/3, \pi/3]$?