I. FIND THE DERIVATIVE OF EACH FUNCTION

1. $f(x) = \tan(\ln(x))$

2. $f(x) = x^4 e^{\frac{1}{\sqrt{x}}}$

3. $f(x) = \dfrac{x + \ln(x)}{e^x - 1}$

4. $f(x) = e^{\sin(x)}$

5. $f(x) = \ln\left(\sqrt[4]{x^3 + 1}\right)$

6. $f(x) = x^3 \ln(x^2 + 2)$

7. $f(x) = \ln\left(\ln(x^2)\right)$

8. $f(x) = \ln(x^3)\, e^{\sqrt{1-3x}}$

9. $f(x) = \dfrac{e^{(4x)} + x^2}{\sec(x) + \ln(x)}$

10. $f(x) = \ln\left(\sec(x)\right)$

11. $f(x) = \dfrac{x^2 (x-3)^{1/4}}{x^2 + 3}$

12. $f(x) = \tan(x)^{2x}$

II. FIND EACH INDEFINITE INTEGRAL.

13. $\displaystyle\int \frac{1}{x+5}\, dx$

14. $\displaystyle\int \frac{\ln(x)}{x}\, dx$

15. $\displaystyle\int e^x \cos(e^x)\, dx$

16. $\displaystyle\int x^2 e^{x^3 - 4}\, dx$

17. $\displaystyle\int \frac{x^2 - 2}{x^3 - 6x + 1}\, dx$

18. $\displaystyle\int \frac{\sec(x)\tan(x)}{\sqrt{1 + 3\sec(x)}}\, dx$

19. $\displaystyle\int \frac{8e^{\sqrt{x}}}{\sqrt{x}}\, dx$

20. $\displaystyle\int \frac{e^{5x}}{5 + 5e^{5x}}\, dx$

III. EVALUATE EACH DEFINITE INTEGRAL.

21. $\displaystyle\int_1^e \frac{1}{x\left(1 + \ln(x)\right)}\, dx$

22. $\displaystyle\int_0^{\pi/2} 2\sin(x)\, e^{\cos(x)}\, dx$