

MATH 12002
Derivative & Integral Problems

Find the derivatives of the following functions.

1. $y = \ln(\cos x)$

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

2. $y = x^2 \ln(1 - x^2)$

15. $y = e^{-\frac{1}{x}}$

3. $y = \sqrt{\ln x}$

16. $y = x^{\ln x}$

4. $y = \ln|x^3 - x^2|$

17. $y = (x^e)^x$

5. $y = \ln\left(\frac{x^2 + 2}{x^2 + 3}\right)^{2/3}$

18. $y = \frac{e^x}{e^x + 1}$

6. $y = \frac{\ln x}{1 + x^2}$

19. $y = \tan^{-1}(x^2)$

7. $y = \ln|\tan 2x|$

20. $y = (\sin^{-1} x)(\ln x)$

8. $y = \sin(\ln 2x)$

21. $y = (\sin^{-1} x)^2$

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

22. $y = \ln(\sin^{-1} x)$

10. $y = e^{\sqrt{x}}$

23. $y = (1 + x^2) \tan^{-1} x$

11. $y = 7^{x^4}$

24. $y = \cos^{-1} \sqrt{2x - 1}$

12. $y = x^2 e^x$

25. $y = \tan^{-1}(\sin x)$

13. $y = (\sin x)^x$

26. $y = \frac{1}{\tan^{-1} x}$

Compute the following integrals.

$$1. \int \frac{3x}{(1+4x^2)^{10}} dx$$

$$2. \int \frac{3x}{1+4x^2} dx$$

$$3. \int \frac{3}{1+4x^2} dx$$

$$4. \int \frac{1}{4+x^2} dx$$

$$5. \int \frac{1}{3+x^2} dx$$

$$6. \int \frac{1}{\sqrt{25-4x^2}} dx$$

$$7. \int \frac{x}{\sqrt{25-4x^2}} dx$$

$$8. \int \frac{1}{x\sqrt{4x^2-25}} dx$$

$$9. \int \frac{x}{\sqrt{4x^2-25}} dx$$

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

$$11. \int \frac{e^x}{\sqrt{1-e^{2x}}} dx$$

$$12. \int \frac{e^{2x}}{\sqrt{1-e^{2x}}} dx$$

$$13. \int \frac{1+e^x}{e^x} dx$$

$$14. \int \frac{e^x}{1+e^x} dx$$

$$15. \int \frac{e^x}{1+e^{2x}} dx$$

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

$$17. \int \frac{e^{2x}}{1+e^{4x}} dx$$

$$18. \int \frac{\sin x \cos x}{\sqrt{1-\cos^2 x}} dx$$

$$19. \int \frac{\sin x}{\sqrt{1-\cos^2 x}} dx$$

$$20. \int \frac{\sin x}{\sqrt{1-\cos x}} dx$$

$$21. \int \frac{\sin x}{\sqrt{1-4\cos^2 x}} dx$$

$$22. \int \frac{\sin x}{9+\cos^2 x} dx$$

$$23. \int \frac{\sin x \cos x}{1+\cos^4 x} dx$$

$$24. \int \frac{\sin x \cos^3 x}{1+\cos^4 x} dx$$