

Question Bank – Shawnm Mudhafer Saleh – Mathematics II

- Integrate:

1. $\int \frac{dx}{x\sqrt{5x^2-4}}$

2. $\int \frac{ydy}{\sqrt{1-y^4}}$

3. $\int_{\pi/6}^{\pi/4} \frac{\csc^2 x dx}{1+(\cot x)^2}$

- Derivative:

4. $y = \cot^{-1} \sqrt{t-1}$

5. $y = \sec^{-1}(2s+1)$

6. $y = s\sqrt{1-s^2} + \cos^{-1} s$

Find $f'(x)$ and identify the domain and range of f' then check it

7. $f(x) = \frac{1}{2}x - \frac{7}{2}$

8. $f(x) = \frac{1}{x^3}$

9. Integrate:

$$\int_0^2 \frac{dt}{8+2t^2}$$

10. Derivative:

$$y = \csc^{-1} \frac{x}{2}$$

11. Integrate:

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

12. Differentiate

$$y = \csc^{-1}(x^2 + 1)$$

13. Integrate:

$$\int \frac{3 \sec^2 t}{6 + 3 \tan t} dt$$

14. Differentiate

$$y = \frac{1 + \ln t}{1 - \ln t}$$

15. Integrate:

$$\int_1^e \frac{2 \ln 10 (\log_{10} x)}{x} dx$$

16. Differentiate

$$y = 7^{\sec \theta} \ln 7$$

17. Integrate this function

$$\int e^{-y} \cos y dy$$

18. Evaluate

$$\int_0^{\pi/6} 3 \cos^5 3x dx$$

Integrate:

19. $\int_0^{\pi/2} \theta^2 \sin 2\theta d\theta$

20. $\int p^4 e^{-p} dp$

21. $\int \sin^2 x \cos^4 x dx$

22. $\int \frac{2s+2}{(s^2+1)(s-1)^2}$

$$23. \int \frac{x^2 dx}{\sqrt{9-x^2}}$$

$$24. \text{For Matrices } A = \begin{pmatrix} 2 & 3 \\ 1 & 5 \end{pmatrix}, \quad B = \begin{pmatrix} 7 & 2 \\ 3 & 4 \end{pmatrix}$$

Find:

a. $B-A$

b. $A'+B'$

c. $2A+3B$

Differentiate these functions:

$$25. y = t\sqrt{\ln t}$$

$$26. y = \frac{\theta \sin \theta}{\sqrt{\sec \theta}}$$

$$27. y = (1 + 2x)e^{-2x}$$

$$28. y = \log_2 5\theta$$

Integrate these functions

$$29.1. \int \frac{3 \sec^2 t}{6+3 \tan t} dt$$

$$30.2. \int t^3 e^{t^4} dt$$

$$31.3. \int_0^{\pi/2} 7^{\cos t} \sin t dt$$

$$32.4. \int \frac{dx}{\sqrt{9-x^2}}$$

Find the derivative of y with respect to the given independent variable:

$$33. y = \tan^{-1} \sqrt{x+1}$$

$$34. y = \frac{1+\ln t}{t}$$

$$35. y = (9x^2 - 6x + 2)e^{3x}$$

$$36. y = \log_7 \left(\frac{\sin \theta \cos \theta}{e^{\theta 2\theta}} \right)$$

Evaluate the integrals:

$$37. \int_{\pi/2}^{\pi} 2 \cot \frac{\theta}{3} d\theta$$

$$38. \int \frac{e^{1/x}}{x^2} dx$$

$$39. \int \frac{\log_2 x}{x} dx$$

$$40. \int_0^{\pi/4} \left(\frac{1}{3}\right)^{\tan t} \sec^2 t dt$$

Derivatives:

$$41. y = xe^x - e^x$$

Integrate:

$$42. \int t^3 e^{(t^4)} dt$$

Integrate:

$$43. \int \frac{y^2+2y+1}{(y^2+1)^2} dy$$

$$44. \int \frac{dx}{x(x^2+1)^2}$$

$$45. \int \frac{x^2+1}{(x-1)(x-2)(x-3)}$$

$$46. \int \frac{x-1}{(x+1)^3}$$

$$47. \int_{-\pi}^{\pi} \sin 3x \sin 3x dx$$

$$48. \int_0^{\pi/2} \sin x \cos x dx$$

$$49. \int_0^{\pi} \cos 3x \cos 4x dx$$

$$50. \int_{-\pi/2}^{\pi/2} \cos x \cos 7x dx$$