

Evaluate the integrals:

1. $\int \tan^5 x \sec^3 x \, dx$

4. $\int \sqrt{\sin x} \cos^3 x \, dx$

7. $\int_1^{\infty} \frac{dx}{\sqrt{x+3}}$

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

5. $\int \frac{dx}{x^2-3x-4}$

8. $\int_0^3 \frac{dx}{x^2-4}$

3. $\int \sin^{-1} x \, dx$

6. $\int \frac{x^3}{\sqrt{1-x^2}} dx$

9. Write the general form for the partial fraction decomposition, but do not set up the system of equations.

$$\frac{x^3 - 3x^2 + x + 4}{(x-2)^3(x^2+5)^2}$$

10. Find the length of the curve $y^2 = x^3$ from $(0,0)$ to $(1,1)$.

11. Find the area of the surface obtained by rotating $y = \sin x$, $0 \leq x \leq \pi$ about the x -axis.

Find the limit of the sequence if it is convergent:

12. $a_n = \frac{n+1}{\sqrt{n^2+2}}$

15. $a_n = \cos(n\pi) \frac{n+1}{3n^2}$

13. $a_n = \sin\left(\frac{\pi n + 1}{4n - 3}\right)$

16. $a_1 = 2 \quad a_{n+1} = \frac{1}{3 - a_n}$

14. $a_n = \cos(n\pi) \frac{n^2+1}{3n^2}$

Find the sum of the series if it is convergent:

17. $\sum_{n=1}^{\infty} \frac{e^n}{\pi^n}$

19. $\sum_{n=2}^{\infty} \frac{2}{n^2-1}$

18. $\sum_{n=1}^{\infty} \frac{n(n+3)}{(n+5)^2}$

20. $\sum_{n=1}^{\infty} \frac{2^{2n} + 3^n}{5^n}$