

PRACTICE GATEWAY EXAM

1. Find x to 3 decimal places if $\log_2 x + \log_x 2 = 10/3$.
2. Simplify $\sqrt[3]{x^{7/2}x^{-1/3}}$.
3. If $f(x+3) = x^2$ find the formula for $f(x)$.
4. Find all solutions of $|2-x| = 1-3x$.
5. For which values of α does the series $\sum_{n=0}^{\infty} \frac{n}{n^\alpha + 1}$ converge?
6. Evaluate $\lim_{x \rightarrow 0} x \ln x$.
7. Evaluate $\lim_{n \rightarrow \infty} \left(\frac{2}{n} - \frac{n}{n^2 + 1} \right)$.
8. Find all the eigenvalues of $A = \begin{bmatrix} 1 & 0 & 0 \\ 2 & 3 & 0 \\ 4 & 5 & 6 \end{bmatrix}$.
9. Calculate $\int x \sin x \, dx$.
10. Find the volume of a donut obtained by the revolution of the circle $(x-2)^2 + y^2 = 1$ about y -axis.
11. Give an example of a function that is continuous at $x = 0$ but has no derivative there. Give an example of a function that has a derivative at $x = 0$ but is discontinuous there.
12. Write the MacLaurin polynomial of degree 3 for $f(x) = e^x + \sin x$.
13. Find the inverse function of $f(x) = \ln \frac{1+x}{1-x}$ and determine the domain and the range of the inverse function.
14. Evaluate $\lim_{x \rightarrow 0} \frac{\sqrt{x+4} - 2}{x}$.