

HASMUKH GOSWAMI COLLEGE OF ENGINEERING, VAHELAL

APPLIED MATHEMATICS FOR ELECTRICAL ENGINEERING (3130908) TUTORIAL 1: ROOTS OF ALGEBRAIC AND TRANSCENDENTAL EQUATIONS

1. Find the positive root of $x = \cos x$ correct up to three decimal places by bisection method.
 2. Explain Bisection method for solution of equation; find a real root of the $x^3 + x - 1 = 0$ correct up to six decimal places. **Ans.** = 0.686
 3. Evaluate $\sqrt{30}$ by secant method correct to four decimal places. **Ans.** = 5.4772
 4. Find a root of the following equation, using the Newton-Raphson method correct to three decimal places :
(i) $3x^3 - 9x^2 + 8 = 0$ (ii) $x^5 - 5x^2 + 3 = 0$ (iii) $x \sin x + \cos x = 0$ which is near $x = f$
(iv) $e^x = x^3 + \cos 25x$ which is near 4.5 **Ans.** = (i)1.226 (ii)1.662 (iii)2.798 (iv)4.545
 5. The current i in an electric circuit is given by $i = 10e^{-t} \sin 2ft$ where t is in seconds. Using Newton Raphson method, calculate the time t correct to 3 decimal places for $i = 2$ amp. **Ans.** = 0.033 sec.
 6. Derive the Newton Raphson iterative scheme by drawing appropriate figure.
 7. Obtain the Newton Raphson formula from Taylor's Theorem.
 8. Derive Secant Method and solved $xe^x - 1 = 0$ correct up to three decimal places between 0 and 1
 9. Find the iterative formula for finding $\sqrt{N}, \sqrt[3]{N}, N^{-1}, \frac{1}{\sqrt{M}}$ where N,M are real number, using Newton Raphson formula. Hence evaluate (i) $\sqrt{8}$ (ii) $\sqrt[3]{41}$ (iii) $(30)^{-1/5}$ (iv) $\frac{1}{\sqrt{14}}$ correct up to 3 decimal places.
Ans. = (i) 2.828 (ii) 3.448 (iii) 0.506 (iv) 0.267
 10. Perform the five iterations of the bisection method to obtain a root of the equation $\cos x - xe^x = 0$
 11. Compute the real root of $x - 2 \sin x = 0$, correct up to six decimal places using Secant method, starting from $x_0 = 2, x_1 = 1.9$.
 12. Find a real root of the equation $x \log_{10} x = 1.2$ by the Regula falsi method. **Ans:** 2.740
 13. Find the smallest root of an equation $x - e^{-x} = 0$ correct to three significant digits. **Ans:** 0.567
 14. Find a real root of the equation $e^{-x} - \sin x = 0$ by the Regula falsi method. **Ans:** 0.5885
 15. Find the negative root of $x^3 - 7x + 3$ by the bisection method up to three decimal places. **Ans:** -2.838
 16. Find a real root of the equation $e^x \tan x = 1$ by the secant method correct up to three decimal places. **Ans:** 3.183
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