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MTH603 Assignment 1 Solution

Fall 2026

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Fall 2026 | Total Marks: 20 | Due Date: 11 November 2026

Name: VU Learning Hub

MTH603 covers four numerical methods. The four parts below solve each question with full working. Each part shows the formula and each step.

Q1. Decimal to Binary

Change 57.875 into binary in two parts. First change the whole number 57. Halve 57 again and again and note each remainder. 57 gives 28 with 1 left. 28 gives 14 with 0 left. 14 gives 7 with 0 left. 7 gives 3 with 1 left. 3 gives 1 with 1 left. 1 gives 0 with 1 left. Read the remainders upward to get 111001. Now change the fraction 0.875. Double 0.875 again and again and note each whole digit. 0.875 doubled is 1.75. Note 1 and keep 0.75. 0.75 doubled is 1.5. Note 1 and keep 0.5. 0.5 doubled is 1.0. Note 1 and keep 0. Read the taken digits downward to get 111. Put the two parts together to get 111001.111. So 57.875 in binary is 111001.111.

Q2. False Position

Find the root of $x^3 - 2x - 3 = 0$ by false position. Work on the interval 1 to 2. $f(1) = 1 - 2 - 3 = -4$. $f(2) = 8 - 4 - 3 = 1$. The values have unlike signs so a root lies between 1 and 2. First round gives $x1 = (1 \times 1 - 2 \times (-4)) / (1 - (-4)) = 9 / 5 = 1.8$. $f(1.8) = 5.832 - 3.6 - 3 = -0.768$. The sign of f(1.8) matches f(1). So the fresh interval is 1.8 to 2. Second round gives $x2 = (1.8 \times 1 - 2 \times (-0.768)) / (1 - (-0.768)) = 3.336 / 1.768 = 1.8869$. $f(1.8869) = 6.7182 - 3.7738 - 3 = -0.0556$. The value is close to zero. Two rounds give the root as 1.8869.

Q3. Newton Raphson

Find the root of $\sin x - x/2 = 0$ by Newton Raphson. Begin at $x0 = 1.5$. Differentiate f to get $\cos x - 1/2$. At 1.5 the function value is $0.9975 - 0.75 = 0.2475$. At 1.5 the derivative value is $0.0707 - 0.5 = -0.4293$. The first new value is $x1 = 1.5 - 0.2475/(-0.4293) = 1.5 + 0.5766 = 2.0766$. At 2.0766 the function value is $0.8752 - 1.0383 = -0.1631$. At 2.0766 the derivative value is $-0.4837 - 0.5 = -0.9837$. The second new value is $x2 = 2.0766 - (-0.1631)/(-0.9837) = 2.0766 - 0.1658 = 1.9108$. Two rounds give the root as 1.9108.

Q4. Muller Method

Find the root of $x^3 - 3x - 4 = 0$ by Muller method. Begin with $x0 = 1$ and $x1 = 1.5$ and $x2 = 2$. $f(1) = 1 - 3 - 4 = -6$. $f(1.5) = 3.375 - 4.5 - 4 = -5.125$.

f(2) = 8 − 6 − 4 = −2. The gaps are h0 = 1.5 − 1 = 0.5 and h1 = 2 − 1.5 = 0.5. d0 = (−5.125 + 6) / 0.5 = 1.75. d1 = (−2 + 5.125) / 0.5 = 6.25. a = (6.25 − 1.75) / (0.5 + 0.5) = 4.5. b = 4.5 × 0.5 + 6.25 = 8.5. c = −2. Work out $b^2 − 4ac$ as 72.25 + 36 = 108.25. Square root of 108.25 is 10.4043. Add b to the root to get 18.9043. x3 = 2 − 2 × (−2) / 18.9043 = 2 + 0.2116 = 2.2116. Check f(2.2116) = 0.1827. The result is close to zero. One round gives the root as 2.2116.