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| |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | | **University of Asia Pacific** | | | | | | | | **Department of Computer Science & Engineering** | | | | | | | | **Mid-Semester Examination Spring 2020** | | | | | | | | **Program: B.Sc. Engineering (3rd Year/2nd Semester)** | | | | | | | | **Course Code: CSE 313** | | | **Course Title: Numerical Methods** | | **Credit: 3.00** | | | **Time: 1.30 Hour** | | | | **Full Marks: 60** | | | | **Instructions:** Answer **all** questions. All questions are of equal value. Part marks are shown in the margins. | | | | | | | |  | | | | | | | | Q. 1 | a) | What is relative true error? How the relative true error is calculated? | | | | {5} | |  | b) | Use forward divided difference approximation of the first derivative of *f(x) = 3e2.5x+2* to calculate the derivative at *x*=2.12 with a step size of 2. Find the exact value and absolute relative true error. Use four decimal digit arithmetic to find a solution. | | | | {15} | |  |  |  | | | |  | | Q. 2 | a) | What is truncation error? Give an example. | | | | {5} | |  | b) | Assuming an initial bracket of [*−*3, *−*4], what would be the second (at the end of 2 iterations) iterative value of the root of the function *f(x) = x3/2+9x2+7x+5* using the bisection method. Find the absolute relative approximate error and the number of significant digits at least correct at the end of each iteration. Use four decimal digit arithmetic to find a solution. | | | | {15} | |  |  |  | | | |  | | Q. 3 | a) | How relative approximate error minimizes the error while solving a mathematical model using numerical methods? | | | | {5} | |  | b) | Use Newton-Raphson method to estimate the root of *2−x2 =sin(x)*. Conduct 3 iterations with an initial guess **−1.5**. Find the absolute relative approximate error and the number of significant digits at least correct at the end of each iteration. Use four decimal digit arithmetic to find a solution. | | | | {15} | |  |  | **OR**, | | | |  | |  | a) | Write down the advantages and drawbacks of Newton-Raphson method. | | | | {5} | |  | b) | One of the UAP CSE students wishes to find a root of the function *f(x) = cos(x) −x*. He/she will use xi = π/4 and xi−1 = 0.5 as initial approximations. He/she will halt after a maximum of N=3 iterations. Consider four decimal digit arithmetic to find a solution using secant method. Find the absolute relative approximate error and the number of significant digits at least correct at the end of each iteration. | | | | {15} | | | | | | | |
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