**CPSC131 Lecture HW Bisection (30 points)**

**Find the roots for the following questions in both Excel and Matlab program (1- write the output root in both cases. 2- What is the tolerance for your results). Submit your solution in Excel sheets.**



**1) (15) for the following function:**

**(, i.e. absolute value of (new x – old x) /new x )**

**Use EXCEL to evaluate the function since you don’t have the tanh function on your calculators.**

**Use bisection to determine the drag coefficient needed so that a 65-kg bungee jumper has a velocity of 35 m/s after 4.5 sec of free fall. Note: the acceleration of gravity is 9.81 m/s2. Start with initial guesses of xl = 0.2 and xu = 0.3 and iterate until the approximate relative error falls below 2%.**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **iteration** | **xl** | **f(xl)** | **xu** | **f(xu)** | **xr** | **f(xr)** | **error** |
| 1 |  |  |  |  |  |  |  |
| 2 |  |  |  |  |  |  |  |
| 3 |  |  |  |  |  |  |  |
| 4 |  |  |  |  |  |  |  |
| 5 |  |  |  |  |  |  |  |
| 6 |  |  |  |  |  |  |  |
| 7 |  |  |  |  |  |  |  |
| 8 |  |  |  |  |  |  |  |
| 9 |  |  |  |  |  |  |  |
| 10 |  |  |  |  |  |  |  |

2) (15 pts)

**Water is flowing in a trapezoidal channel at a rate of Q = 20 m3/s. The critical depth y for such a channel must satisfy the equation where g = 9.81 m/s2, Ac = the cross-sectional area (m2), and B = the width of the channel at the surface (m). For this case, the width and the cross-sectional area can be related to depth y be B = 3 + y, and . Solve for the critical depth using a) the graphical method, and b) bisection using initial guesses of xl = 0.5 and xu = 2.5 and iterate until the approximate relative error falls below 1% or the number of iterations exceeds 10.**

**a) Graphically (sketch a rough graph of the function).**

**b) Using the bisection method until the error falls below 1%. Employ initial guesses of *xl*= 0.5 and *xu* = 2.5.**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **iteration** | **xl** | **f(xl)** | **xu** | **f(xu)** | **xr** | **f(xr)** | **error** |
| 1 | 0.5 |  | 2.5 |  |  |  |  |
| 2 |  |  |  |  |  |  |  |
| 3 |  |  |  |  |  |  |  |
| 4 |  |  |  |  |  |  |  |
| 5 |  |  |  |  |  |  |  |
| 6 |  |  |  |  |  |  |  |
| 7 |  |  |  |  |  |  |  |
| 8 |  |  |  |  |  |  |  |
| 9 |  |  |  |  |  |  |  |
| 10 |  |  |  |  |  |  |  |