**Q7:**

**Answers**

7a: Householder's method is a numerical algorithm for solving the nonlinear equation . In this case, the cubic convergence rate of one real variable. The method consists of a sequence of iterations

For , due to Newton’s method from Householder’s method:

7b: For , due to Halley’s method from Householder’s method:

And

Therefore,

7c: The Lambert equation, , can be transformed to the general form, , by defining as:

The first derivative of is:

The second derivative of f(y) is:

The ratio is:

The ratio is:

These ratios are used to calculate the updated value of y in Halley's method, which is a Householder's method of the second order, .

7d:

We can rewrite the form of equation of Halley’s method in terms of fraction of the derivatives:

From the values obtained in previous exercises, we can now show that