1. In homework 2a, you used the Simpson’s 1/3 method for numerical integration of the normal probability density function to compute probabilities. This program has been modified to interactively solicit input from the user and output probabilities that are both single-sided and double-sided (i.e., integrate from μ-5⋅σ to c or from μ-(c-μ) to μ+(c-μ)). Create a program titled hw3a.py, that solicits one more piece of information from the user: a probability. Then, use the Secant method to find a value of c that matches the desired probability. You should ask the user if they are specifying c and seeking P OR specifying P and seeking c. Note that this program should handle all possible cases: P(μ-(c-μ)<x<μ+(c-μ)|μ, σ), P(μ-(c-μ)>x>μ+(c-μ)|μ, σ), P(x<c|μ, σ), and P(x>c|μ, σ)
2. In §25.3 p1071 of your MAE 3013 text, the t-distribution is used to calculate confidence intervals when the variance of the population is unknown. Write a program titled hw3b.py that computes the right-hand side of the following equation and compare your results to Table A9. You should test your program for m=7, 11, and 15 degrees of freedom with three different z values chosen by the user from the command line interface. Your program should prompt the user to input the degrees of freedom and value of z and should output the probability.

and

and if α is a positive integer, then

1. In homework 2c, you created a program for solving matrix equations using the Gauss-Seidel method and in class you were give a program for the Doolittle method for LU factorization. In §20.2, p855 in your MAE 3013 text, the Cholesky method is described for factoring **A** into **LLT** such that we can solve the matrix equation **Ax**=**b** → **LLTx**=**b**. The Cholesky method applies to ***symmetric****,* ***positive definite*** matricies (**A**=**AT**, **xTAx**>0 for all x≠**0**). Write a program titled hw3c.py that checks to see if a matrix is symmetric, positive definite and, if so, uses the Cholesky method to solve the matrix equation and if not, uses the Doolittle method.Apply your program to the following two problems with your solution vectors printed nicely and an indication of which numerical method was used:

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A table of numbers and a number of degrees of freedom

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