1. a. n = 6, d = 9, u = 1

xf = (1,1,1,1,1,1)

r = 3.8819 \* e^(-10)

m = 7

n = 6, d = 9, u = 12

xf ~= (-1.6864,2.5296,-2.6258,2.1858,-1.4592,0.6741)

r = 1.0214 \* e^(159)

m = 1000

Observations: The iterations stop converging after u = 9, this is because if u>d the matrix A is no longer diagonally dominant. Hence, it does not converge.

b. n = 6, d = 9, u = 1

xf = (1,1,1,1,1,1)

r = 1.5768\*e^(-10)

m = 9

n = 6, d = 9, u = 12

xf = (1,1,1,1,1,1)

r = 4.4964\*e^(-8)

m = 1000

Observations: Again altering u affects the convergence of the function. Also, at u =12, the data appears to converge; however, the max iteration is reached. Hence, although xf is the correct value, this is a result of round off error. When I changed the max iteration to 10,000 the function converges under the max iteration ceiling.

1. a. n = 6, d = 0, u =1

xf = (1,1,1,1,1,1)

r = 0

m = 1

n = 20, d = 0, u = 1

xf = (1,1,1…..1) dim(xf) = 20

r = 0

m = 1

Observations: the convergence of the function is not dependent the size of n. Furthermore, it continues to converge after one step because the matrix A is in lower triangular form.

b. n = 6, d = 0, u = 1

xf = (1,1,1,1,1,1)

r = 8.267\*e^(-10)

m = 67

n = 20, d = 0, u = 1

xf = 1.8323

-0.8445

-2.3941

-0.4259

3.2988

1.6152

-2.6914

-3.1009

1.4912

3.5334

0.2691

-3.1216

-1.4671

1.8371

1.9732

-0.6556

-1.4722

-0.2437

0.8156

0.2011

r = 7.6131\*e^(120)

m = 1000

Observations: Stops converging after the n>9, this is because all the components of the diagonal of the matrix are now some constant ‘f’ and all the other elements are some constant ‘g.’ Therefore, after the matrix exceeds n = 9, it must be the case that the sum of the row elements excluding the diagonal are greater than the diagonal or not diagonally dominant.

c. n = 6, d = 0, u = 1

xf = (1,1,1,1,1,1)

r = 9.7011\*e^(-10)

m = 139

n = 20, d = 0, u = 1

xf = (1,1,1….1) dim (xf) = 20

r = 3.0189\*e^(-8)

m = 1000

Observations: Although the function converges at n = 20, the function is stopped by the max iteration ceiling. However, once again if I change the maxiter the function converges. Therefore, I can conclude that by increasing the size of n, the function will converge with d = 0 and u = 1. However, it will take the computer more steps to compute the output. Hence, the matrix will always remain diagonally dominant.

1. a. n = 6, d = 0, u = 1 //converges for d = 2 and u = 3

xf = 6.7853

-5.1639

-2.8973

4.2986

2.0161

-4.1080

r = 1.0064\*e^(45)

m = 1000

b. n = 6, d = 0, u = 1

xf = 0.5265

1.2996

1.2957

0.7062

0.7573

1.3490

r = 2.0919e^(-5)

m = 1000

Observations: For all values of n>4, the function does not converge with d = 0 and u = 1. It must be the case that this matrix will never be diagonally dominant. The reason must be that the (n,1) component of the matrix A must compute elements, such that there sum (excluding (n,n))is greater than (n,n). Hence, it will never converge for values n>4.