

## Midterm #1

```
1. function [xN] = Richardson(n,A,b,w,x0,N)
    for k = 1:N
        for i = 1:n
            xN(i,1) = 0;
            for j = 1:n
                xN(i,1) = xN(i,1)-A(i,j)*x0(j,1);
            end
            xN(i,1) = x0(i,1)+w*b(i,1)-w*xN(i,1);
        end
        for i = 1:n
            x0(i,1) = xN(i,1);
        end
    end
end
```

2.
  - $28 \times 28$  matrix:  $l_{28,4} = 3, u_{28,28} = -19$ .
  - $30 \times 30$  matrix:  $l_{30,4} = 2, u_{30,30} = -18$ .
  - $32 \times 32$  matrix:  $l_{32,4} = -2, u_{32,32} = -13$ .
  - $34 \times 34$  matrix:  $l_{34,4} = -3, u_{34,34} = -12$ .
3.
  - For matrix with  $a_{33} = \gamma$ , the additional condition is  $|\alpha| > |\beta|$ .
  - For matrix with  $a_{33} = \beta$ , the additional condition is  $|\beta| > |\gamma|$ .
4. See HW solutions.