Assignment: Homework 5 Name: Tanner Orndorff

Disclaimer: This is my work, not that of others:

Total Score: 75.0

Problem 2.5,1b,c score: 25

Computer Problem 2.5, 3 score: 25

Problem 2.7, 1a,b score: 25

Computer Problem 2.7, 3 score: 0

2.7, 1a, 1b

(1a)

$F(u,v) = (u^3, uv^3)$

$$\begin{bmatrix} \frac{df_1}{u} & \frac{df_1}{v} \\ \frac{df_2}{u} & \frac{df_2}{v} \end{bmatrix} \text{ or } DF(x) = \begin{bmatrix} 3u^2 & 0 \\ v^3 & 3uv^2 \end{bmatrix}$$

(1b)

$F(u,v) = (\sin uv, e^{uv})$

$$DF(x) = \begin{bmatrix} v\cos uv & u\cos uv \\ ve^{uv} & ue^{uv} \end{bmatrix}$$

example, requires about
number of

$$\begin{bmatrix} 3 & 1 & 1 \\ 1 & 3 & 1 \\ 1 & 1 & 3 \end{bmatrix} \begin{bmatrix} u \\ v \\ w \end{bmatrix} = \begin{bmatrix} 6 \\ 3 \\ 5 \end{bmatrix}$$

$$\begin{bmatrix} u_{k+1} \\ v_{k+1} \\ w_{k+1} \end{bmatrix} = \begin{bmatrix} 1/3 & 0 & 0 \\ 0 & 1/3 & 0 \\ 0 & 0 & 1/3 \end{bmatrix} \left(\begin{bmatrix} 6 \\ 3 \\ 5 \end{bmatrix} - \begin{bmatrix} 0 & 1 & 1 \\ 1 & 0 & 1 \\ 1 & 1 & 0 \end{bmatrix} \begin{bmatrix} u_k \\ v_k \\ w_k \end{bmatrix} \right)$$

$0u_k + 1v_k + 1w_k$

$u_k + w_k$

$$\begin{bmatrix} 6 \\ 3 \\ 5 \end{bmatrix} - \begin{bmatrix} v_k + w_k \\ u_k + w_k \\ u_k + v_k \end{bmatrix}$$

$$\begin{bmatrix} 1/3 & 0 & 0 \\ 0 & 1/3 & 0 \\ 0 & 0 & 1/3 \end{bmatrix} \left(\begin{bmatrix} 6 - v_k - w_k \\ 3 - u_k - w_k \\ 5 - u_k - v_k \end{bmatrix} \right)$$

$$u_{k+1} = \frac{6 - u_k - w_k}{3}$$

$$v_{k+1} = 3 - \frac{u_k - w_k}{3}$$

$$w_{k+1} = .5 - \frac{u_k - v_k}{3}$$

$$u_{k+1} = \frac{6 - v_k - w_k}{3}$$

$$v_{k+1} = \frac{3 - u_{k+1} - w_k}{3}$$

$$w_{k+1} = \frac{5 - u_{k+1} - v_{k+1}}{3}$$

$$\begin{bmatrix} u_1 \\ v_1 \\ w_1 \end{bmatrix} = \begin{matrix} 2 \\ 1 \\ 5/3 \end{matrix}$$

$$\begin{bmatrix} u_2 \\ v_2 \\ w_2 \end{bmatrix} = \begin{matrix} 10/9 \\ -2/9 \\ 2/3 \end{matrix}$$

$$u_1 = 2$$

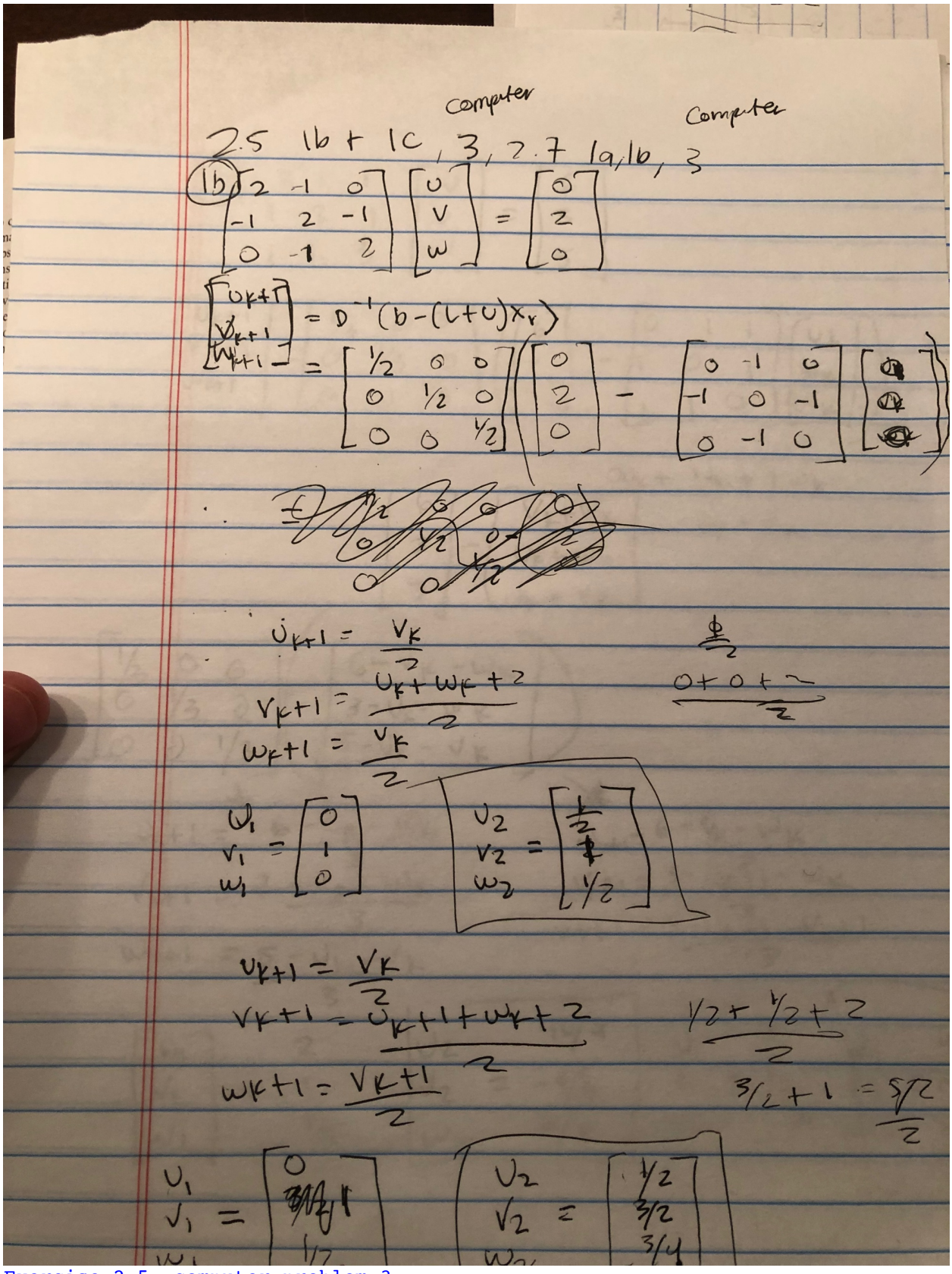
$$v_1 = 1/3$$

$$w_1 = 8/9$$

v_2

$v_2 =$

w_2



Exercise 2.5, computer problem 3

```
function x = gaussseidel(a,b,k)
n=length(b);          % find n
d=diag(diag(a)); u=triu(a,1);l=tril(a,-1);
x=zeros(n,1);         % Initialize vector x
for j=1:k             % loop for GS iteration
  b1=b-u*x;
  for i=1:n
      x(i)=(b1(i)-l(i,:)*x)/d(i,i);
  end
end
```

called code:

```
%2.24
n= [3,-1,0,0,0,.5
    -1,3,-1,0,.5,0
    0,-1,3,-1,0,0
    0,0,-1,3,-1,0
    0,.5,0,-1,3,-1
    .5,0,0,0,-1,3];
[a,b] = sparsesetup(n);
x = gausseidel(a,b,5);
```