第二次作业

第一题

```
template <class ElemType>
void CyQueue<ElemType>::EnQueue(CyQueue &Q, ElemType x) {
    if (flag && rear == front)
        cout << "Queue Full!!" << endl;
    Q.queue[rear] = x;
    rear = (rear + 1) % MaxSize;
    if (!flag)
        flag = 1;
}
template <class ElemType> ElemType CyQueue<ElemType>::OutQueue(CyQueue &Q) {
    if (!flag)
        cout << "Queue Empty!!" << endl;
    ElemType e = array[front];
    front = (front + 1) % Q.MaxSize;
    if (front == rear)
        flag = 0;
    return e;
}
```

第二题

(1)

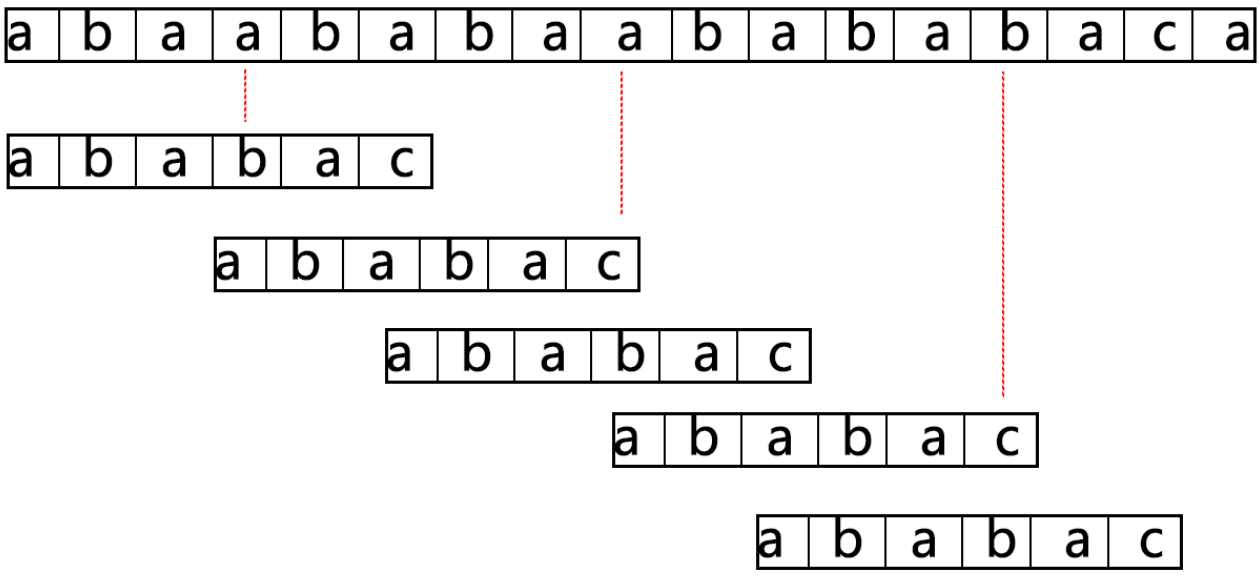
```
For(int i = 0; i < halfSize; i++) Push(s,Deque(q));


While(!isEmptyStack(s)) {
    EnQueue(q,Pop(s));
    EnQueue(q,DeQue(q));

}
```

(2)

```
    void reverseQueueFirstKElements(int k, struct Queue *q) {
        if (q == NULL || k > size(q))
            return;
        else if (k > 0) {
            struct Stack *s = CreateStack();
            for (int i = 0; i < k; i++)
                Push(s, DeQueue(q));
            while(!isEmptyStack(s)) EnQueue(q, Pop(s));
            EnQueue(q, DeQue(q));
        }
    }
```

第三题

```
void next(char *P, int N[]) {
    int m = strlen(P);
    N[0] = 0;
    int i = 1, j = 0;
    while (i < m) {
        if (P[i] == P[j]) {
            N[i] = j + 1;
            i++;
            j++;
        } else if (j > 0)
            j = N[j - 1];
        else {
            N[i++] = 0;
        }
    }
}
```



比较了22次

第四题

$n = \sum_{i=1}^{h} k^{i-1} = \frac{k^h - 1}{k-1}$
叶子节点数为$k^h = n(k-1) + 1$

第五题

(1)

$$2^{h-1} - 1 < 500$$
$$2^h - 1 \geq 500$$
$$\Rightarrow h = 9$$

(2)

$$500 - (2^{h-1} - 1) = 245个$$

(3)

$$2^{h-1} - 1 - (2^{h-1} - 245) = 244个$$

第六题

```
int BinaryTree::FindMax(TNODE *root) {
    int root_val, left, right, max = INT_MIN;
    if (root != NULL) {
        root_val = root.value;
        left = FindMax(root.left);
        right = FindMax(root.right);
        max = max(left, right, root_val);
    }
    return max
}
```

时间复杂度：$O(n)$**空间复杂度：**$O(n)$

第七题

```
int BinaryTree::FindLevelwithMaxSum(BinaryTree *root) {
    TNODE *temp;
    int level = 0, maxLevel = 0;
    struct Queue Q;
    int currentSum = 0, maxSum = 0;
    if (!root)
        return 0;
    InitQueue(Q);
    EnQueue(Q, root);
    while (!Q.isEmpty()) {
        int size = Q.size();
        while (size-- > 0) {
            temp = DeQueue(Q);
            currentSum += temp.value;

            if (temp.left)
                EnQueue(Q, temp.left);
            if (temp.right)
                EnQueue(Q, temp.right);
        }
        if (maxSum < currentSum)
            maxSum = currentSum;
        currentSum = 0;
    }
    return maxSum;
}
```

时间复杂度：$O(n)$**空间复杂度：**$O(n)$

第八题

上界: 当 E 条边全部集中在一个连通分支时连通分量最大，当该分支为完全图时有最少个点

$$E=\frac{n(n-1)}{2}\Rightarrow n\geq\lceil\frac{1+\sqrt{1+8E}}{2}\rceil$$

$$因此连通分量为V-\lceil\frac{1+\sqrt{1+8E}}{2}\rceil+1$$

下界:

$$\begin{cases}当E\geq V-1时，下界为1\\当E<V-1时，下界为V-E\end{cases}$$

第九题

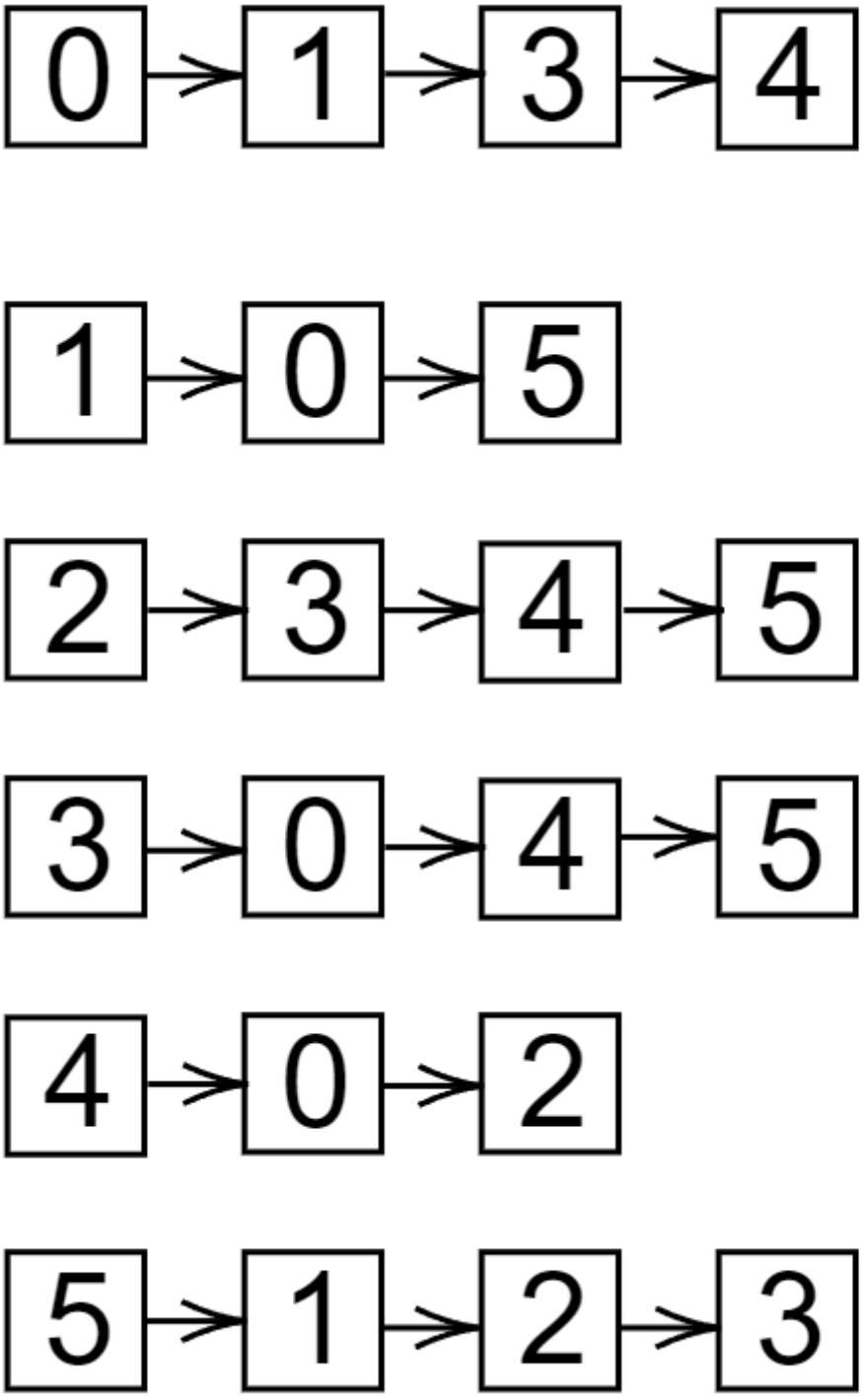
入度: $\sum_{k=0}^{n-1}A[k][i]$

出度: $\sum_{k=0}^{n-1}A[i][k]$

度： $\sum_{k=0}^{n-1}(A[k][i]+A[i][k])$

第十题

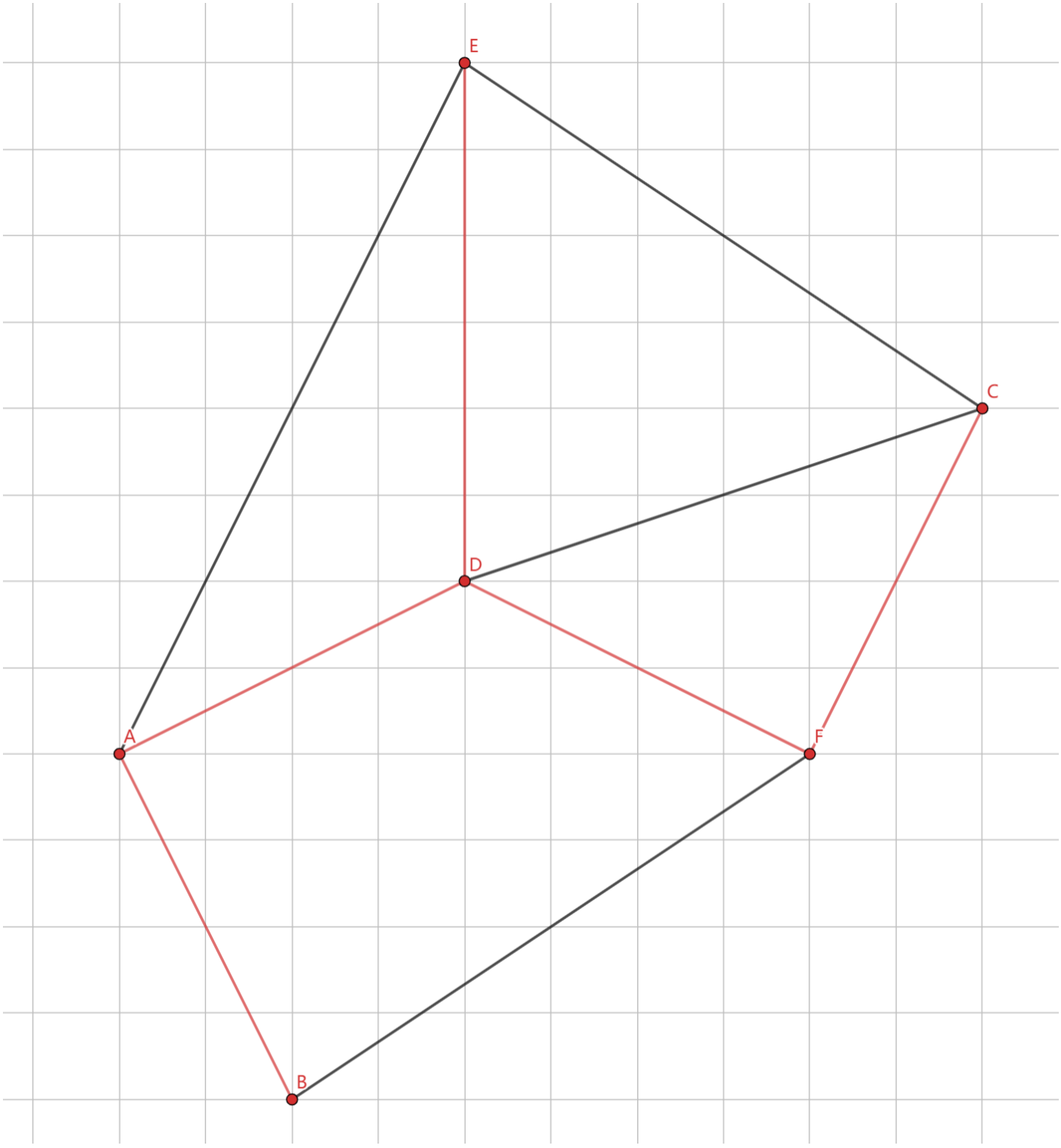
(1)



(2)

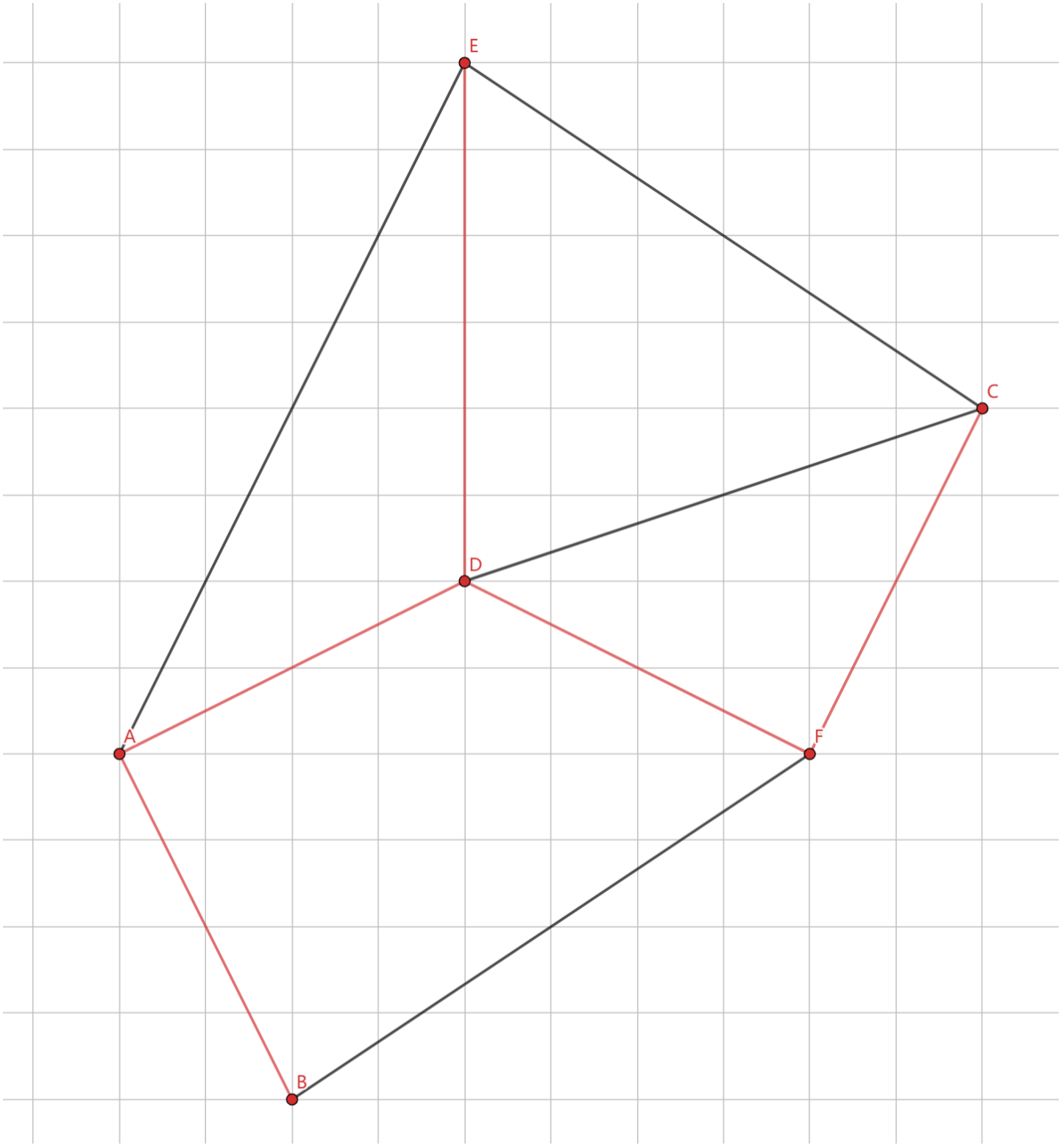
Prim

顺序： 3-5,0-3,0-1,2-5,3-4



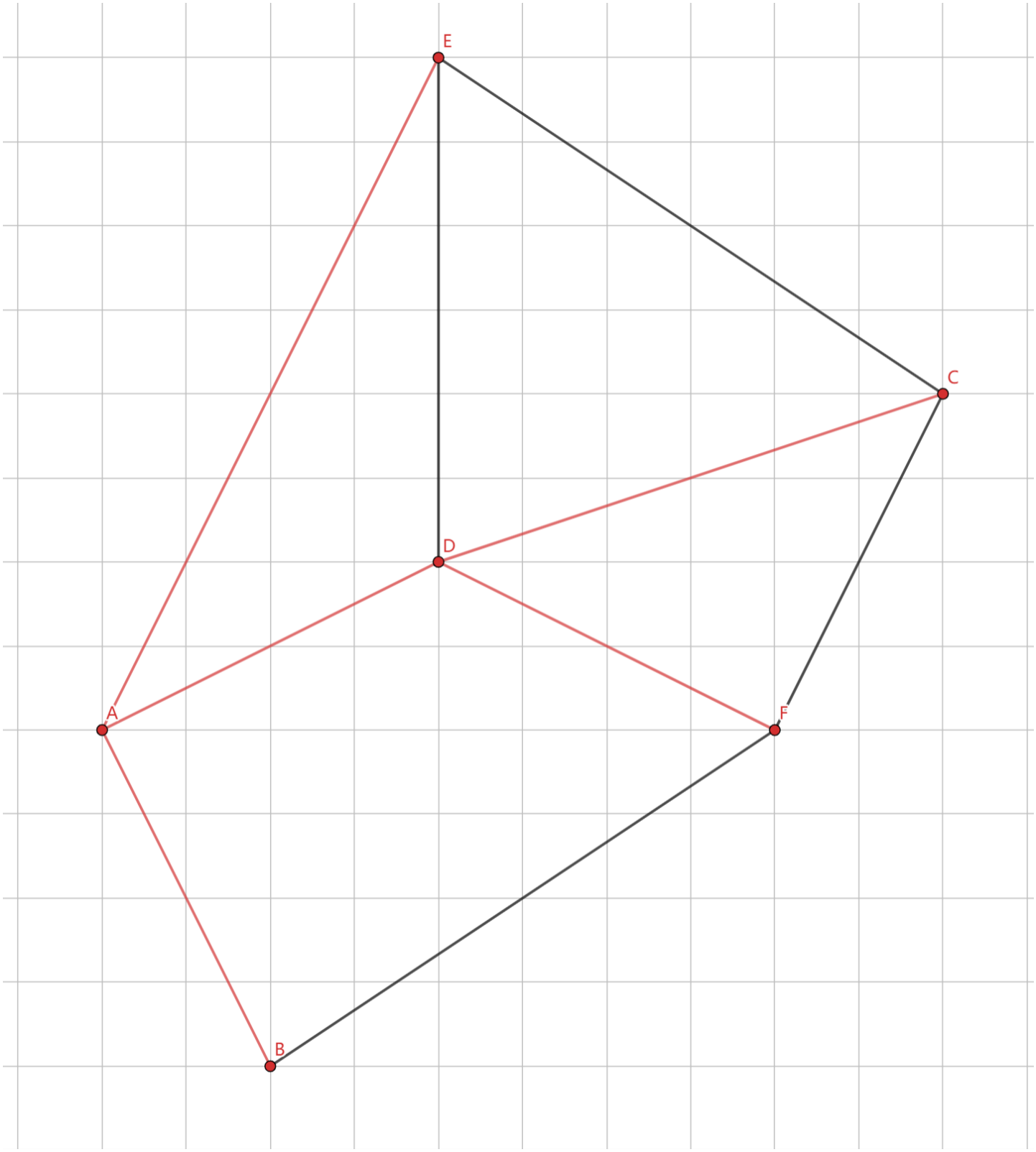
Kruskal

顺序： 3-5,0-3,0-1,2-5,3-4



(3)

以A点作为源点



第十一題

```
Graph *ReverseTheDirectedGraph(Graph *G) {
    Graph *Gr;
    if (G == NULL) {
        Gr = NULL;
        return NULL;
    }
    Initialize(Gr, Vcnt(G), NULL);
    int n = Vcnt(G);
    for (int i = 0; i < n; i++) {
        for (int j = 0; j < n; j++) {
            if (G->edge(i, j))
                Gr->insert(j, i);
        }
    }
}
```