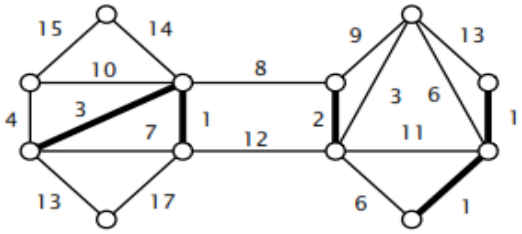
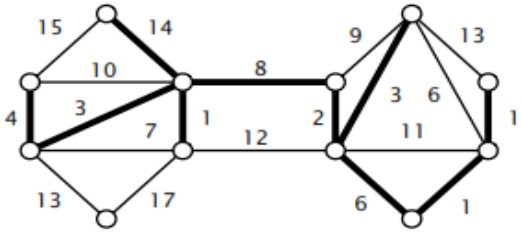
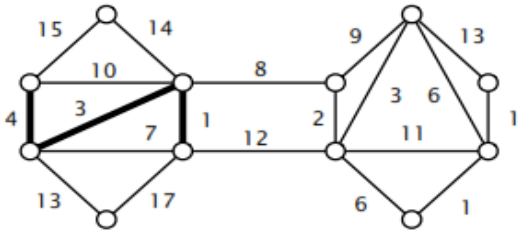
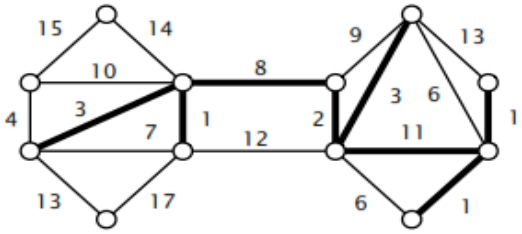
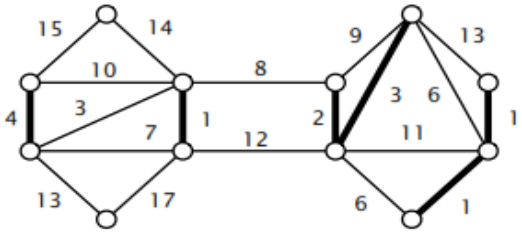
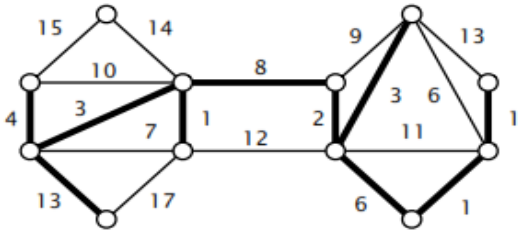
Q1 Minimum Spanning Tree Algorithms (12 points)

Each of the figures below represents a partial spanning tree. Determine whether it could possibly be obtained from,Prim's algorithm, Kruskal's algorithm, both or neither.

	PRIM	KRUSKAL	BOTH	NEITHER
	○	○	○	○
	○	○	○	○
	○	○	○	○
	○	○	○	○
	○	○	○	○
	○	○	○	○

Q2 Analysis of Algorithms (10 points)

For each code fragment on the left, check the best matching order of growth of the running time. You may use an answer more than once or not at all.

	N	$\log N$	$N \log N$	$R+N$	RN	$N+R^2$	$(N+R)\log N$	$N(N+R)$

`int x = 1, i;`
`for(i = 0; i < N; i++)`
`  x++;`
	○	○	○	○	○	○	○	○

`public static int f2(int N) {`
`  int x = 1;`
`  while(x < N)`
`  x = x * 2;`
`  return x;`
`}`
	○	○	○	○	○	○	○	○

`int x = 0, i;`
`for(i = 0; i < N; i++)`
`  x += f2(N);`
	○	○	○	○	○	○	○	○

`int x = 1, i, j;`
`for(i = 0; i < N; i++)`
`  for(j = 1; j < R; j++)`
`  x = x * j;`
	○	○	○	○	○	○	○	○

`int x = 0, i, j;`
`for(i = 1; i <= N; i++)`
`  for(j = 1; j <= N+R; j+=i)`
`  x += j;`
	○	○	○	○	○	○	○	○

Q3- Eight sorting algorithms (10 points)

The column on the left is the original input of strings to be sorted the column on the right are the strings in sorted order; the other columns are the contents at some intermediate step during one of the algorithms listed below. Match up each algorithm by writing its number under the corresponding column. Use each number exactly once.

0	deer	bass	bass	bear	bear	bull	tuna	bass
1	clam	bull	bear	bull	bull	clam	swan	bear
2	bear	bear	bull	calf	calf	bear	sole	bull
3	myna	crow	calf	clam	clam	bass	myna	calf
4	tuna	deer	clam	deer	deer	crow	lion	clam
5	slug	clam	crab	dove	dove	crab	slug	crab
6	dove	calf	crow	gnat	lynx	calf	seal	crow
7	moth	dove	deer	lynx	moth	deer	mule	deer
8	lynx	hoki	dove	moth	myna	lynx	lynx	dove
9	bull	duck	duck	myna	slug	moth	crow	duck
10	calf	crab	gnat	pony	sole	dove	clam	gnat
11	sole	mule	hoki	seal	tuna	sole	puma	hoki
12	pony	moth	pony	slug	gnat	pony	pony	lion
13	seal	lynx	seal	sole	hoki	seal	dove	lynx
14	gnat	gnat	myna	swan	mule	gnat	gnat	moth
15	swan	puma	swan	tuna	pony	swan	moth	mule
16	mule	myna	mule	mule	seal	mule	deer	myna
17	hoki	seal	sole	hoki	swan	hoki	hoki	pony
18	duck	lion	tuna	duck	bass	duck	duck	puma
19	crab	sole	slug	crab	crab	slug	crab	seal
20	crow	pony	lynx	crow	crow	tuna	bull	slug
21	bass	tuna	moth	bass	duck	myna	bass	sole
22	lion	slug	lion	lion	lion	lion	calf	swan
23	puma	swan	puma	puma	puma	puma	bear	tuna
	----	----	----	----	----	----	----	----
	0	**4**	**2**	**3**	**5**	**6**	**7**	1

(0) Original input (1) Sorted (2) Selection sort (3) Insertion sort
(4) Shellsort (5) Mergesort (6) Quicksort (7) Heapsort

Q4 insert the following number in a redblack tree (2,1,4,5,9,3,6,7)
And show each step(10 points).

Q5 Find longest common subsequence (LCS) BETWEEN Algorithm and Alignment using daynamic programming Show detailed steps(10 points)

Q7- Find the shotrest path for the following graph from s to t (10 points)