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Soal no 1 :

```
def semua_path(graph, start, end, path=[]):
    path = path + [start]
    if start == end:
        return [path]
    if not start in graph:
        return []
    paths = []
    for node in graph[start]:
        if not node in path:
            newpaths = semua_path(graph, node, end, path)
            for newpath in newpaths:
                paths.append(newpath)
    return paths

def path_terpendek(graph, start, end, path=[]):
    path = path + [start]
    if start == end:
        return path
    if not start in graph:
        return None
    pendek = None
    for node in graph[start]:
        if node not in path:
            newpath = path_terpendek(graph, node, end, path)
            if newpath:
                if not pendek or len(newpath) < len(pendek):
                    pendek = newpath
    return pendek

def Cari_ListPathTerpendek(Allpaths, ShortestPath):
    List_pendek = []
    for path in Allpaths:
        if len(path) == len(ShortPath):
            List_pendek.append(path)
    return List_pendek

def displayBlock(Paths):
    for i in range(len(Paths)):
        print('Path', i+1, '=', Paths[i])

def Cari_semuaEdge(graphs):
    List_Edge = []
    for keys in graphs.keys():
        if graphs[keys] != []:
```

```

        for value in graphs[keys]:
            temp = keys+' => '+value,
            List_Edge.append(temp)
    return List_Edge

gasgraph = {
    'A': ['B','C','D'],
    'B': ['E','C','F'],
    'C': ['F'],
    'D': ['C','T','G'],
    'E': ['T'],
    'F': ['T'],
    'G': ['T'],
    'T': []
}
SemuaEdge = Cari_semuaEdge(gasgraph)
print('\nBanyaknya Edge : ')
displayBlock(SemuaEdge)
Listsemua_path = semua_path(gasgraph,'A','T')
print('\nBanyaknya Path : ')
displayBlock(Listsemua_path)
ShortPath = path_terpendek(gasgraph,'A','T')
ListPathTerpendek = Cari_ListPathTerpendek(Listsemua_path,ShortPath)
print('\nPath Terpendek : ')
displayBlock(ListPathTerpendek)

```

Output :

```

Banyaknya Edge :
Path 1 = ('A => B',)
Path 2 = ('A => C',)
Path 3 = ('A => D',)
Path 4 = ('B => E',)
Path 5 = ('B => C',)
Path 6 = ('B => F',)
Path 7 = ('C => F',)
Path 8 = ('D => C',)
Path 9 = ('D => T',)
Path 10 = ('D => G',)
Path 11 = ('E => T',)
Path 12 = ('F => T',)
Path 13 = ('G => T',)

Banyaknya Path :
Path 1 = ['A', 'B', 'E', 'T']
Path 2 = ['A', 'B', 'C', 'F', 'T']
Path 3 = ['A', 'B', 'F', 'T']
Path 4 = ['A', 'C', 'F', 'T']
Path 5 = ['A', 'D', 'C', 'F', 'T']
Path 6 = ['A', 'D', 'T']
Path 7 = ['A', 'D', 'G', 'T']

Path Terpendek :
Path 1 = ['A', 'D', 'T']
PS C:\Users\INSTIKI\Downloads\p>

```

Soal no 2 :

```
def mergesort(arr):
    if len(arr) <= 1:
        return arr

    tengah = len(arr) // 2
    half_kiri = arr[:tengah]
    hals_kanan = arr[tengah:]

    half_kiri = mergesort(half_kiri)
    hals_kanan = mergesort(hals_kanan)

    return merge(half_kiri, hals_kanan)

def merge(left, right):
    hasil = []
    x = 0
    y = 0

    while x < len(left) and y < len(right):
        if left[x] > right[y]:
            hasil.append(left[x])
            x += 1
        else:
            hasil.append(right[y])
            y += 1

    while x < len(left):
        hasil.append(left[x])
        x += 1

    while y < len(right):
        hasil.append(right[y])
        y += 1

    return hasil

data = input("Input angka satu persatu (batasi dengan spasi): ").split()
data = [int(i) for i in data]

data = mergesort(data)

print("Data terurut dari besar ke kecil:", data)
```

Output :

```
PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL

Windows PowerShell
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Try the new cross-platform PowerShell https://aka.ms/pscore6

PS C:\Users\INSTIKI\Downloads\p> conda activate C:\Users\INSTIKI\anaconda3
conda : The term 'conda' is not recognized as the name of a cmdlet, function, script file, or operable program. Check the spelling.
At line:1 char:1
+ conda activate C:\Users\INSTIKI\anaconda3
+ ~~~~~
+ CategoryInfo          : ObjectNotFound: (conda:String) [], CommandNotFoundException
+ FullyQualifiedErrorId : CommandNotFoundException

PS C:\Users\INSTIKI\Downloads\p> & C:/Users/INSTIKI/anaconda3/python.exe c:/Users/INSTIKI/Downloads/p/soal2_mergesort.py
Input angka satu persatu (batasi dengan spasi): 1 2 3 4 5 6 7 8 9 10 11 12 13
Data terurut dari besar ke kecil: [13, 12, 11, 10, 9, 8, 7, 6, 5, 4, 3, 2, 1]
PS C:\Users\INSTIKI\Downloads\p> █
```

Soal no 3 :

```
def binary_search(data, cari):
    low = 0
    high = len(data) - 1
    mid = 0
    while low <= high:
        mid = (high + low) // 2
        if data[mid] < cari:
            low = mid + 1
        elif data[mid] > cari:
            high = mid - 1
        else:
            return mid
    return -1

# data = [ 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 39]

# memasukkan data
data = input("Masukkan data (batasi dengan spasi): ").split()
data = [int(i) for i in data]

# print data
print("Data : ",data)
cari = int(input("Masukkan data yang ingin dicari : "))
result = binary_search(data, cari)
if result != -1:
    print("Data yang anda cari ditemukan pada indeks ke-", str(result))
else:
    print("Data yang Anda cari tidak ditemukan pada data")
```

Output :

```
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At line:1 char:1
+ conda activate C:\Users\INSTIKI\anaconda3
+ ~~~~~
+ CategoryInfo          : ObjectNotFound: (conda:String) [], CommandNotFoundException
+ FullyQualifiedErrorId : CommandNotFoundException

PS C:\Users\INSTIKI\Downloads\p> & C:/Users/INSTIKI/anaconda3/python.exe c:/Users/INSTIKI/Downloads/p/soal3_binary.py
Masukkan data (batasi dengan spasi): 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
Data : [1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15]
Masukkan data yang ingin dicari : 7
Data yang anda cari ditemukan pada indeks ke- 6
PS C:\Users\INSTIKI\Downloads\p> █
```