

In [94]:

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import pandas as pd  
import matplotlib.pyplot as plt
```

In [95]:

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##### uploaded flie
def load_dataset(virus):
    table = pd.read_csv("virus.csv")
    id_list = table["id"].values.tolist()
    virus_count_list = table["virus count"].values.tolist()
    print(table.head(4))
    print(f"The number of citizens in the database is: {len(id_list)}")
    return virus_count_list, id_list

##### first histogram
def virus_count_hist(virus_count_list,max_val ,min_val):
    #min_val = min(virus_count_list)
    #max_val = max(virus_count_list)
    hist = [0 for _ in range (max_val+1)]
    for i in virus_count_list:
        hist[i] += 1
    plt.bar(range(len(hist)), hist)
    plt.show()
    return(hist)

##### custom histogram
def custom_histogram_fun(virus_count_list, max_val, min_val, step):
    #min_val = min(virus_count_list)
    #max_val = max(virus_count_list)
    custom_virus_count_list = [int(val/step) for val in virus_count_list]
    custom_hist = [0 for _ in range (int(max_val/step)+1)]
    for i in custom_virus_count_list:
        custom_hist[i] += 1
    hist_range = []
    for i in range(len(custom_hist)):
        low_cap = i*step
        top_cap = int((i+1)*step)-1
        hist_range.append(str(low_cap)+str("-")+str(top_cap))
        if top_cap >= 100:
            if low_cap == 100:
                hist_range[-1] = str(low_cap)
            if low_cap < 100:
                hist_range[-1] = str(low_cap)+str("-")+str(100)
    plt.bar(hist_range, custom_hist)
    plt.xticks(rotation='vertical')
    plt.show()

##### sick families
def sick_families(id_list,virus_count_list,virus_count):
    family_number = []
    complication = [0]*len(id_list)
    family_check = [0]*len(id_list)
    for i in range(len(virus_count_list)):
        if complication[i] == 0:
            complication[i] = 1
            if virus_count_list[i] >= virus_count:
                family_id = str(id_list[i])[5:7]
                family_countdown = [id_list[i]]
                family_count = [id_list[i]]
                #print(len(family_count))
                print("Sick citizen found:",str(id_list[i])+",","number of virus:",virus_count_list[i])
                for j in range(len(virus_count_list)):
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        if str(id_list[j])[5:7] == family_id:
            if id_list[j] == id_list[i]:
                pass
            else:
                print("    Family member:", str(id_list[j])+",", "number of virus:", virus_count_list[j])

                complication[j] = 1
                family_count.append(id_list[j])
                #print(len(family_count))
                #family_count = [id_list[j]]
                if family_check[int(str(id_list[i])[5:7])] == 0:
                    #family_count.append(id_list[j])
                    #print(len(family_count))
                    if virus_count_list[j] >= virus_count:
                        family_check[int(str(id_list[i])[5:7])] = 1
                        family_countdown.append(id_list[j])
                        #family_countdown.append(id_list[j])
                        #family_number.append(id_list[j])

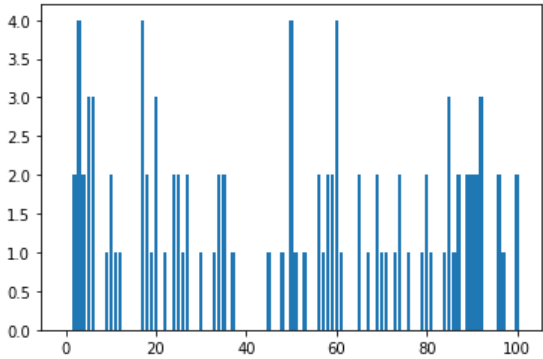
        if len(family_countdown) >= 2:
            print("    QUARANTINE REQUIRED!")
            family_number.append(id_list[i])
    for i in range(len(family_number)):
        family_number[i] = int(str(family_number[i])[5:7])
    return(family_number)

##### giving a vaccine
def cure_families(id_list, virus_count_list, family_number, high_bound, low_bound):
    cured = 0
    hist = [0] * ((high_bound - low_bound) + 1)
    for i in range(len(family_number)):
        hist[int(family_number[i])] = 1
    for i in range(len(id_list)):
        #print(str(id_list[i])[5:7])
        if hist[int(str(id_list[i])[5:7])] == 1:
            cured += 1
            virus_count_list[i] = 0
    print(cured, "citizens have been cured!")
    return(virus_count_list)

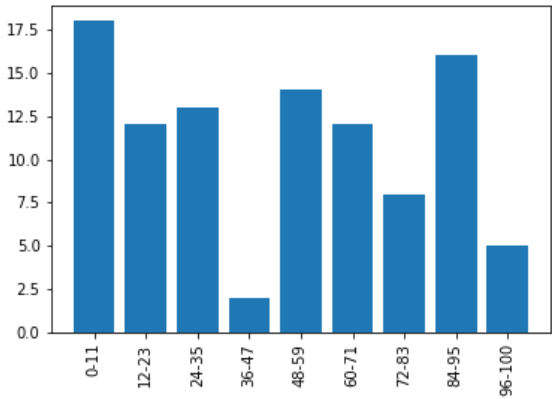
```

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In [96]:  
virus_count_list,id_list = load_dataset("virus.csv") #A  
hist = virus_count_hist(virus_count_list, 100, 0) #B  
step = (int(input("Please insert histogram range step: "))) #C  
custom_histogram_fun(virus_count_list, 100, 0, step)  
virus_count = int(input("Please insert virus count limit: ")) #D  
family_number = sick_families(id_list,virus_count_list,virus_count)  
cure_families(id_list, virus_count_list, family_number, 100, 0) #E  
custom_histogram_fun(virus_count_list, 100, 0, step)
```

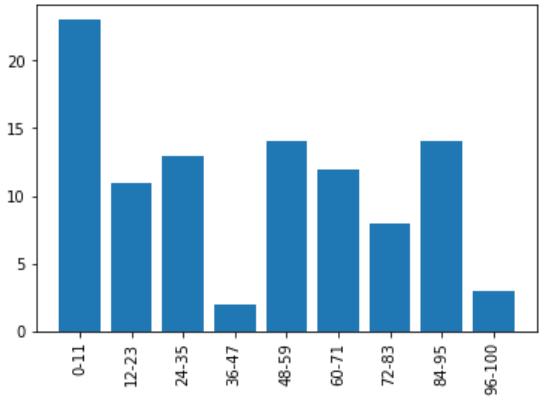
```
id virus count
0 78659407      24
1 72120014      17
2 70875374     100
3 74394801       5
The number of citizens in the database is: 100
```



Please insert histogram range step: 12

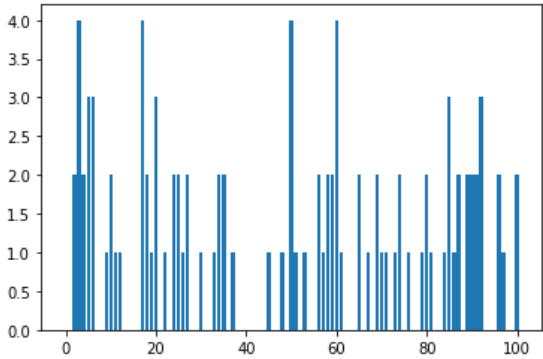


```
Please insert virus count limit: 92
Sick citizen found: 70875374, number of virus: 100
Sick citizen found: 72611726, number of virus: 96
Family member: 75866725, number of virus: 92
QUARANTINE REQUIRED!
Sick citizen found: 89422339, number of virus: 100
Sick citizen found: 88609238, number of virus: 96
Family member: 82785236, number of virus: 69
Sick citizen found: 80867202, number of virus: 97
Family member: 82521206, number of virus: 19
Family member: 72272206, number of virus: 92
QUARANTINE REQUIRED!
Sick citizen found: 89357114, number of virus: 92
5 citizens have been cured!
```

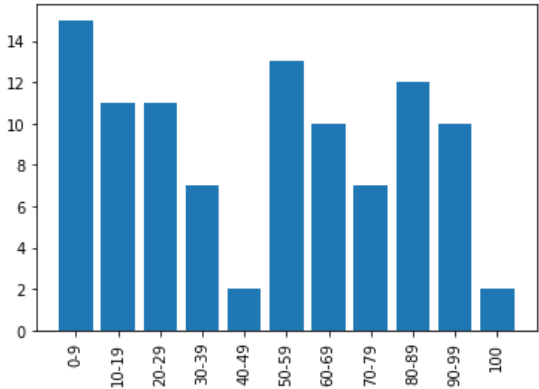


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In [ ]:
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id virus count
0 78659407      24
1 72120014      17
2 70875374     100
3 74394801       5
The number of citizens in the database is: 100
```

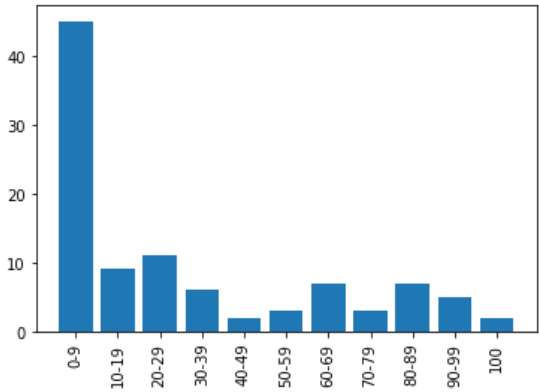


Please insert histogram range step: 10



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Please insert virus count limit: 43
Sick citizen found: 70875374, number of virus: 100
Sick citizen found: 73456452, number of virus: 69
    Family member: 71436455, number of virus: 17
Sick citizen found: 75985663, number of virus: 74
    Family member: 83582661, number of virus: 17
Sick citizen found: 80904427, number of virus: 60
    Family member: 76822423, number of virus: 59
    QUARANTINE REQUIRED!
Sick citizen found: 89529017, number of virus: 45
    Family member: 72120014, number of virus: 17
Sick citizen found: 78867772, number of virus: 80
Sick citizen found: 71515210, number of virus: 56
    Family member: 79377213, number of virus: 65
    QUARANTINE REQUIRED!
Sick citizen found: 78035357, number of virus: 50
    Family member: 87603350, number of virus: 71
    Family member: 88396350, number of virus: 10
    Family member: 89351353, number of virus: 50
    QUARANTINE REQUIRED!
Sick citizen found: 79297675, number of virus: 59
Sick citizen found: 78264894, number of virus: 51
    Family member: 81862897, number of virus: 35
    Family member: 87992896, number of virus: 81
    QUARANTINE REQUIRED!
Sick citizen found: 87970274, number of virus: 67
    Family member: 80414278, number of virus: 3
    Family member: 88074273, number of virus: 26
Sick citizen found: 89066047, number of virus: 85
    Family member: 83526046, number of virus: 34
Sick citizen found: 73391550, number of virus: 85
Sick citizen found: 82431163, number of virus: 58
    Family member: 88446161, number of virus: 3
    Family member: 85237161, number of virus: 56
    QUARANTINE REQUIRED!
Sick citizen found: 72611726, number of virus: 96
    Family member: 75866725, number of virus: 92
    QUARANTINE REQUIRED!
Sick citizen found: 72489593, number of virus: 70
Sick citizen found: 89422339, number of virus: 100
Sick citizen found: 75174686, number of virus: 60
Sick citizen found: 76817799, number of virus: 58
    Family member: 88599796, number of virus: 30
Sick citizen found: 71260923, number of virus: 53
Sick citizen found: 76662619, number of virus: 90
    Family member: 73789618, number of virus: 25
    Family member: 70485616, number of virus: 3
Sick citizen found: 79818884, number of virus: 89
    Family member: 70086882, number of virus: 12
Sick citizen found: 79012859, number of virus: 60
Sick citizen found: 72918903, number of virus: 76
    Family member: 70529902, number of virus: 87
    QUARANTINE REQUIRED!
Sick citizen found: 86715072, number of virus: 50
    Family member: 82440073, number of virus: 4
    Family member: 74330075, number of virus: 74
    QUARANTINE REQUIRED!
Sick citizen found: 75930412, number of virus: 85
Sick citizen found: 76533140, number of virus: 86
Sick citizen found: 88609238, number of virus: 96
    Family member: 82785236, number of virus: 69
    QUARANTINE REQUIRED!
Sick citizen found: 83931445, number of virus: 73
    Family member: 81866441, number of virus: 18
Sick citizen found: 85712136, number of virus: 91
    Family member: 89335130, number of virus: 10
Sick citizen found: 78892182, number of virus: 84
    Family member: 74123182, number of virus: 50
    QUARANTINE REQUIRED!
Sick citizen found: 89088362, number of virus: 87
    Family member: 75145369, number of virus: 79
    QUARANTINE REQUIRED!
Sick citizen found: 80867202, number of virus: 97
    Family member: 82521206, number of virus: 19
    Family member: 72272206, number of virus: 92
    QUARANTINE REQUIRED!
Sick citizen found: 78104741, number of virus: 90
Sick citizen found: 88205388, number of virus: 60
Sick citizen found: 86487124, number of virus: 61
Sick citizen found: 84442286, number of virus: 48
    Family member: 76574284, number of virus: 3
    Family member: 85786280, number of virus: 4
Sick citizen found: 85762007, number of virus: 91
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Sick citizen found: 89357114, number of virus: 92
Sick citizen found: 75194659, number of virus: 80
  Family member: 76349659, number of virus: 57
    QUARANTINE REQUIRED!
Sick citizen found: 77910221, number of virus: 89
Sick citizen found: 76969718, number of virus: 65
  Family member: 81591718, number of virus: 25
32 citizens have been cured!
```



לפיתרון של התרגיל השני, בחרתי בקלט של 10 לסעיף ג' ושל 43 לקלט של סעיף ה'. בחרתי בסעיף ג' במספר שמחלק את 100 ללא שארית, ככה רואים שהציר האופקי בגרף כתוב בצורה טובה ונכונה. בסעיף ה' בחרתי בקלט של 43, מספר זה נמוך מ50 ולכן ניתן לראות מספר גדול יחסית של חיסונים. דבר זה גם מתבטא בגרף אשר ניתן לראות בו ירידה משמעותית בכמות הוורוסים בקבוצת המחקר ביחס לאותה קבוצה בסעיף ג'

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In [ ]:
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