```c
#include <stdlib.h>
#include <stdio.h>
#include <fcntl.h>
#include <math.h>
#include <string.h>

struct dpoint{
    double key;
    int n;
    double f;
};

//generate mas from file
int
generateMas(struct dpoint* mas, char* name)
{
    int n=0;
    double tmp = 0.0;
    FILE* in = fopen(name,"r");
    fscanf(in,"%lf",&tmp);
    mas[0].key = tmp;
    mas[0].n = 1;
    n = 1;
    while(fscanf(in,"%lf",&tmp) != EOF){
        int flg = 1;
        for(int i = 0; i < n; i++){
            if(tmp == mas[i].key){
                mas[i].n++;
                flg = 0;
                break;
            }
        }
        if(flg){
            mas[n].key = tmp;
            mas[n].n = 1;
            n++;
        }
    }
    fclose(in);
    int sum = 0;
    for (int i = 0; i < n; ++i){
        sum += mas[i].n;
    }
    for (int i = 0; i < n; ++i){
        mas[i].f = (double)mas[i].n/sum;
    }
    return n;
}

// swap mas[a] and mas[b]
void
swap(struct dpoint* mas, int a, int b)
{
    struct dpoint tmp = mas[a];
    mas[a] = mas[b];
    mas[b] = tmp;
}

```

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59. //sort mas
60. void
61. sort(struct dpoint* mas, int n)
62. {
63.     for (int i = 0; i < n-1; i++){
64.         for (int j = i+1; j < n; j++){
65.             if (mas[j].key < mas[i].key){
66.                 swap(mas,i,j);
67.             }
68.         }
69.     }
70. }
71. 
72. //generate Var-row
73. void
74. generateVar(struct dpoint* mas, int n)
75. {
76.     FILE* out = fopen("V.txt","w");
77.     for (int i = 0; i < n; i++){
78.         fprintf(out, "|%.3lf | %ld |\n",mas[i].key,mas[i].n);
79.         fprintf(out, "_____________________\n");
80.     }
81.     fclose(out);
82. }
83. 
84. void
85. genDataABS(struct dpoint* mas, int n)
86. {
87.     FILE* out = fopen("DPh.txt","w");
88.     for (int i = 0; i < n; ++i){
89.         fprintf(out, "%d %.3lf\n",mas[i].n,mas[i].key);
90.     }
91.     fclose(out);
92. }
93. 
94. void
95. genDataRel(struct dpoint* mas, int n)
96. {
97.     FILE* out = fopen("DPh1.txt","w");
98.     for (int i = 0; i < n; ++i){
99.         fprintf(out, "%.3lf %.3lf\n",mas[i].f,mas[i].key);
100.     }
101.     fclose(out);
102. }
103. 
104. void
105. genDataF(struct dpoint* mas, int n)
106. {
107.     FILE* out = fopen("F.txt","w");
108.     double sum = 0;
109.     fprintf(out, "0.000 %lf\n",-2*abs(mas[0].key));
110.     for (int i = 0; i < n; ++i)
111.     {
112.         fprintf(out, "%.3lf %.3lf\n\n",sum,mas[i].key);
113.         sum+= mas[i].f;
114.         fprintf(out, "%.3lf %.3lf\n",sum,mas[i].key);
115.     }
116.     fprintf(out, "1.000 %.3lf\n",2*mas[n-1].key);
```

```
117.     fclose(out);
118. }
119. 
120. void
121. genDigParam(struct dpoint* mas, int n)
122. {
123.     FILE* out = fopen("Dig.txt","w");
124.     double x = 0.0;
125.     double D = 0.0;
126.     double sig = 0.0;
127.     double S = 0.0;
128.     int sum = 0;
129.     for (int i = 0; i < n; ++i){
130.         x+= mas[i].key*mas[i].n;
131.         D+= mas[i].key*mas[i].n*mas[i].key;
132.         sum += mas[i].n;
133.     }
134.     x /= sum;
135.     D /= sum;
136.     D -= x*x;
137.     sig = sqrt(D);
138.     S = D*(sum-1)/sum;
139.     fprintf(out, "X выборочное = %- -.3lf\n",x);
140.     fprintf(out, "D выб = %- -.3lf\n",D);
141.     fprintf(out, "среднее кв.отклонение = %- -.3lf\n",sig);
142.     fprintf(out, "S = %- -.3lf\n",S);
143.     fclose(out);
144. }
145. 
146. //удаляем данные
147. void
148. delData(int tmp)
149. {
150.     switch(tmp){
151.         case 1:
152.             system("rm V.txt");
153.             break;
154.         case 2:
155.             system("rm RelPh.png");
156.             system("rm AbsPh.png");
157.             system("rm DPh.txt");
158.             system("rm DPh1.txt");
159.             break;
160.         case 3:
161.             system("rm F.txt");
162.             system("rm F.png");
163.             break;
164.         case 4:
165.             system("rm Dig.txt");
166.             break;
167.         default:
168.             break;
169.     }
170. }
171. 
172. int
173. main(void)
174. {
```

```
    struct dpoint mas[100];
    int n = 0;
    n = generateMas(mas,"data.txt");
    sort(mas,n);
    printf("1 - составление вариационного ряда\n");
    printf("2 - составления ряда частот и относительных частот\n");
    printf("3 - постоение F(x) \n");
    printf("4 - вычисление характеристик(Хв,Dв,sig,S\n");
    int tmp;
    scanf("%d",&tmp);
    printf("N is %d\n",n);
    switch(tmp){
        case 1:
            generateVar(mas,n);
            system("subl V.txt");
            break;
        case 2:
            genDataABS(mas,n);
            genDataRel(mas,n);
            system("gnuplot scr_2_1.txt");
            system("gnuplot scr_2_2.txt");
            system("ristretto AbsPh.png");
            break;
        case 3:
            genDataF(mas,n);
            system("gnuplot scr_3.txt");
            system("ristretto F.png");
            break;
        case 4:
            genDigParam(mas,n);
            system("subl Dig.txt");
            break;
        default:
            break;
    }
    printf("Введите целое число для завершения\n");
    scanf("%d",&n);
    delData(tmp);
    return 0;
}
```