SWE485: Selected Topics in Software Engineering
Software Engineering Department
King Saud University
3rd term 1444

Heart Attack Analysis & Prediction using Machine Learning Algorithms

Group Members		
#	**Name**	**ID**
1	Najd Awadh Almutairi	441200520
2	Ruyuf Albarrak	439200293
3	Khawlah Alghanim	441201130

Group Number	3
Section Number	74984
Supervisor	Dr. Manal BinKhonain

Table of Contents

1. Introduction

The dataset we have chosen is a heart attack analysis & prediction dataset, We have chosen this dataset since the correct prediction of heart attacks can prevent life threats, and incorrect prediction can prove to be fatal at the same time.

2. The goal of Choosing the dataset

The dataset provides a list of values such as: age, sex, blood pressure, cholesterol level, chest pain and some other attributes. The goal of choosing this dataset is to predict the chance of heart attack by analyzing the relationship between the patient attributes and the target variable, which is binary outcome, so: 0 = less chance of heart attack and 1= more chance of heart attack by applying machine learning techniques.

3. Machine learning Tasks

Since the class label in the dataset "output" is known, therefore our problem is a supervised machine learning problem. And since some values of the class label are binary values (zero or one), therefore, our problem is a classification problem because the problem requires predicting a target. For that, we will use a supervised machine learning classification algorithm to predict whether it has a chance of a heart attack or not based on the values of some attributes.

Supervised learning

To predict whether the there is a chance of heart attack or not, we will use the following machine learning algorithms:

- Logistic Regression algorithm
- K-Nearest Neighbors (KNN) algorithm

4. Data

a. Kind of data:

- Heart Attack Analysis & Prediction Dataset contains information indicate if the person has more chance of heart attack compared with normal person.

b. Data source:

- We got the dataset from Kaggle. Dataset URL: https://www.kaggle.com/datasets/rashikrahmanpritom/heart-attack-analysis-prediction-dataset

c. Data exploration:

1) Number of observations: our data set contains 303 rows and 14 columns
2) Describe the meaning of each variable
    a) Age : Age of the patient
    b) Sex : Sex of the patient (1 = male; 0 = female)
    c) exang: exercise induced angina (1 = yes; 0 = no)
    d) ca: number of major vessels (0-3)
    e) cp : Chest Pain type chest pain type
        i) Value 1: typical angina
        ii) Value 2: atypical angina
        iii) Value 3: non-anginal pain
        iv) Value 4: asymptomatic
    f) trtbps : resting blood pressure (in mm Hg)
    g) chol : cholesterol in mg/dl fetched via BMI sensor
    h) fbs : (fasting blood sugar > 120 mg/dl) (1 = true; 0 = false)
    i) rest_ecg : resting electrocardiographic results
        i) Value 0: normal.
        ii) Value 1: having ST-T wave abnormality (T wave inversions and/or ST elevation or depression of > 0.05 mV).
        iii) Value 2: showing probable or definite left ventricular hypertrophy by Estes' criteria.
    j) thalach : maximum heart rate achieved
    k) target: 0= less chance of heart attack 1= more chance of heart attack

3) Number of variables and data types:

```
data.dtypes
```

```
[9]: age           int64
     sex           int64
     cp            int64
     trtbps        int64
     chol          int64
     fbs           int64
     restecg       int64
     thalachh      int64
     exng          int64
     oldpeak     float64
     slp           int64
     caa           int64
     thall         int64
     output        int64
     dtype: object
```

d. Sample of raw dataset:

```
[12]: data.head()
```

[12]:

	age	sex	cp	trtbps	chol	fbs	restecg	thalachh	exng	oldpeak	slp	caa	thall	output
0	63	1	3	145	233	1	0	150	0	2.3	0	0	1	1
1	37	1	2	130	250	0	1	187	0	3.5	0	0	2	1
2	41	0	1	130	204	0	0	172	0	1.4	2	0	2	1
3	56	1	1	120	236	0	1	178	0	0.8	2	0	2	1
4	57	0	0	120	354	0	1	163	1	0.6	2	0	2	1

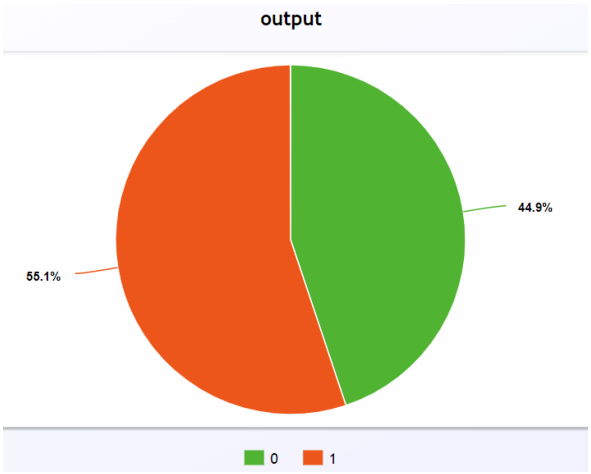
e. Variables distribution:

i. Distribution plot

# age Age of the person	# sex Gender of the person	# cp Chest Pain type chest pain type	# trtbps resting blood pressure (in mm Hg)	# chol cholestoral in mg/dl fetched via BMI sensor	# fbs (fasting blood sugar > 120 mg/dl) (1 = true; 0 = false)	# restecg resting electrocardiographic results
29 77	0 1	0 3	94 200	126 564	0 1	0 2
63	1	3	145	233	1	0
37	1	2	130	250	0	1
41	0	1	130	204	0	0
56	1	1	120	236	0	1
57	0	0	120	354	0	1
57	1	0	140	192	0	1

# thalachh maximum heart rate achieved	# thalachh maximum heart rate achieved	# exng exercise induced angina (1 = yes; 0 = no)	# oldpeak Previous peak	# slp Slope	# caa number of major vessels (0-3)	# output Target variable
71 202	71 202	0 1	0 6.2	0 2	0 4	0 1
150	150	0	2.3	0	0	1
187	187	0	3.5	0	0	1
172	172	0	1.4	2	0	1
178	178	0	0.8	2	0	1
163	163	1	0.6	2	0	1
148	148	0	0.4	1	0	1

ii. Pie chart of output types:



f. Missing values:

```
data.isnull()
```

[14]:

	age	sex	cp	trtbps	chol	fbs	restecg	thalachh	exng	oldpeak	slp	caa	thall	output
0	False	False	False	False	False	False	False	False	False	False	False	False	False	False
1	False	False	False	False	False	False	False	False	False	False	False	False	False	False
2	False	False	False	False	False	False	False	False	False	False	False	False	False	False
3	False	False	False	False	False	False	False	False	False	False	False	False	False	False
4	False	False	False	False	False	False	False	False	False	False	False	False	False	False
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
298	False	False	False	False	False	False	False	False	False	False	False	False	False	False
299	False	False	False	False	False	False	False	False	False	False	False	False	False	False
300	False	False	False	False	False	False	False	False	False	False	False	False	False	False
301	False	False	False	False	False	False	False	False	False	False	False	False	False	False
302	False	False	False	False	False	False	False	False	False	False	False	False	False	False

303 rows × 14 columns

g. Statistical summaries:

[15]:
```
data.describe()
```

[15]:

	age	sex	cp	trtbps	chol	fbs	restecg	thalachh	exng	oldpeak	slp	caa	thall	output
count	303.000000	303.000000	303.000000	303.000000	303.000000	303.000000	303.000000	303.000000	303.000000	303.000000	303.000000	303.000000	303.000000	303.000000
mean	54.366337	0.683168	0.966997	131.623762	246.264026	0.148515	0.528053	149.646865	0.326733	1.039604	1.399340	0.729373	2.313531	0.544554
std	9.082101	0.466011	1.032052	17.538143	51.830751	0.356198	0.525860	22.905161	0.469794	1.161075	0.616226	1.022606	0.612277	0.498835
min	29.000000	0.000000	0.000000	94.000000	126.000000	0.000000	0.000000	71.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
25%	47.500000	0.000000	0.000000	120.000000	211.000000	0.000000	0.000000	133.500000	0.000000	0.000000	1.000000	0.000000	2.000000	0.000000
50%	55.000000	1.000000	1.000000	130.000000	240.000000	0.000000	1.000000	153.000000	0.000000	0.800000	1.000000	0.000000	2.000000	1.000000
75%	61.000000	1.000000	2.000000	140.000000	274.500000	0.000000	1.000000	166.000000	1.000000	1.600000	2.000000	1.000000	3.000000	1.000000
max	77.000000	1.000000	3.000000	200.000000	564.000000	1.000000	2.000000	202.000000	1.000000	6.200000	2.000000	4.000000	3.000000	1.000000

```
data.var()
```

[4]:
```
age           81.865757
sex            0.217553
cp             1.065114
trtbps       308.472817
chol        2678.423588
fbs            0.127225
restecg        0.276705
thalachh     524.571561
exng           0.221084
oldpeak        1.348971
slp            0.379794
caa            1.013542
thall          0.375800
output         0.248971
dtype: float64
```

5. Data preprocessing

We deeply check our dataset to decide what techniques we need to apply. Because all variables in our data are numeral, we didn't need to do the variable transformation. Also, because our data was already classified into categorical attributes, we didn't need to do the discretization. Moreover. Because most of the variables in our data are of type integer, we didn't need to do the normalization.

Data cleaning:

The dataset didn't contain a null value but there is one duplicate in row 164 so we removed it.

```
duplic= data.duplicated()

print(data[duplic])
```

```
     age  sex  cp  trtbps  chol  fbs  restecg  thalachh  exng  oldpeak  slp  \
164   38    1   2     138   175    0        1       173     0      0.0    2

     caa  thall  output
164    4      2       1
```

+ Code + Markdown

We use this code to remove duplicate row

```
data= data.drop_duplicates()
```

And this our data after remove row 164

	age	sex	cp	trtbps	chol	fbs	restecg	thalachh	exng	oldpeak	slp	caa	thall	output
0	63	1	3	145	233	1	0	150	0	2.3	0	0	1	1
1	37	1	2	130	250	0	1	187	0	3.5	0	0	2	1
2	41	0	1	130	204	0	0	172	0	1.4	2	0	2	1
3	56	1	1	120	236	0	1	178	0	0.8	2	0	2	1
4	57	0	0	120	354	0	1	163	1	0.6	2	0	2	1
5	57	1	0	140	192	0	1	148	0	0.4	1	0	1	1
6	56	0	1	140	294	0	0	153	0	1.3	1	0	2	1
7	44	1	1	120	263	0	1	173	0	0.0	2	0	3	1
8	52	1	2	172	199	1	1	162	0	0.5	2	0	3	1
9	57	1	2	150	168	0	1	174	0	1.6	2	0	2	1
10	54	1	0	140	239	0	1	160	0	1.2	2	0	2	1
11	48	0	2	130	275	0	1	139	0	0.2	2	0	2	1
12	49	1	1	130	266	0	1	171	0	0.6	2	0	2	1
13	64	1	3	110	211	0	0	144	1	1.8	1	0	2	1
14	58	0	3	150	283	1	0	162	0	1.0	2	0	2	1
15	50	0	2	120	219	0	1	158	0	1.6	1	0	2	1
16	58	0	2	120	340	0	1	172	0	0.0	2	0	2	1
17	66	0	3	150	226	0	1	114	0	2.6	0	0	2	1
18	43	1	0	150	247	0	1	171	0	1.5	2	0	2	1
19	69	0	3	140	239	0	1	151	0	1.8	2	2	2	1
20	59	1	0	135	234	0	1	161	0	0.5	1	0	3	1
21	44	1	2	130	233	0	1	179	1	0.4	2	0	2	1
22	42	1	0	140	226	0	1	178	0	0.0	2	0	2	1
23	61	1	2	150	243	1	1	137	1	1.0	1	0	2	1
24	40	1	3	140	199	0	1	178	1	1.4	2	0	3	1
25	71	0	1	160	302	0	1	162	0	0.4	2	2	2	1

26	59	1	2	150	212	1	1	157	0	1.6	2	0	2	1
27	51	1	2	110	175	0	1	123	0	0.6	2	0	2	1
28	65	0	2	140	417	1	0	157	0	0.8	2	1	2	1
29	53	1	2	130	197	1	0	152	0	1.2	0	0	2	1
30	41	0	1	105	198	0	1	168	0	0.0	2	1	2	1
31	65	1	0	120	177	0	1	140	0	0.4	2	0	3	1
32	44	1	1	130	219	0	0	188	0	0.0	2	0	2	1
33	54	1	2	125	273	0	0	152	0	0.5	0	1	2	1
34	51	1	3	125	213	0	0	125	1	1.4	2	1	2	1
35	46	0	2	142	177	0	0	160	1	1.4	0	0	2	1
36	54	0	2	135	304	1	1	170	0	0.0	2	0	2	1
37	54	1	2	150	232	0	0	165	0	1.6	2	0	3	1
38	65	0	2	155	269	0	1	148	0	0.8	2	0	2	1
39	65	0	2	160	360	0	0	151	0	0.8	2	0	2	1
40	51	0	2	140	308	0	0	142	0	1.5	2	1	2	1
41	48	1	1	130	245	0	0	180	0	0.2	1	0	2	1
42	45	1	0	104	208	0	0	148	1	3.0	1	0	2	1
43	53	0	0	130	264	0	0	143	0	0.4	1	0	2	1
44	39	1	2	140	321	0	0	182	0	0.0	2	0	2	1
45	52	1	1	120	325	0	1	172	0	0.2	2	0	2	1
46	44	1	2	140	235	0	0	180	0	0.0	2	0	2	1
47	47	1	2	138	257	0	0	156	0	0.0	2	0	2	1
48	53	0	2	128	216	0	0	115	0	0.0	2	0	0	1
49	53	0	0	138	234	0	0	160	0	0.0	2	0	2	1
50	51	0	2	130	256	0	0	149	0	0.5	2	0	2	1
51	66	1	0	120	302	0	0	151	0	0.4	1	0	2	1
52	62	1	2	130	231	0	1	146	0	1.8	1	3	3	1
53	44	0	2	108	141	0	1	175	0	0.6	1	0	2	1
54	63	0	2	135	252	0	0	172	0	0.0	2	0	2	1
55	52	1	1	134	201	0	1	158	0	0.8	2	1	2	1
56	48	1	0	122	222	0	0	186	0	0.0	2	0	2	1
57	45	1	0	115	260	0	0	185	0	0.0	2	0	2	1
58	34	1	3	118	182	0	0	174	0	0.0	2	0	2	1
59	57	0	0	128	303	0	0	159	0	0.0	2	1	2	1
60	71	0	2	110	265	1	0	130	0	0.0	2	1	2	1
61	54	1	1	108	309	0	1	156	0	0.0	2	0	3	1
62	52	1	3	118	186	0	0	190	0	0.0	1	0	1	1
63	41	1	1	135	203	0	1	132	0	0.0	1	0	1	1
64	58	1	2	140	211	1	0	165	0	0.0	2	0	2	1
65	35	0	0	138	183	0	1	182	0	1.4	2	0	2	1
66	51	1	2	100	222	0	1	143	1	1.2	1	0	2	1
67	45	0	1	130	234	0	0	175	0	0.6	1	0	2	1
68	44	1	1	120	220	0	1	170	0	0.0	2	0	2	1
69	62	0	0	124	209	0	1	163	0	0.0	2	0	2	1
70	54	1	2	120	258	0	0	147	0	0.4	1	0	3	1
71	51	1	2	94	227	0	1	154	1	0.0	2	1	3	1
72	29	1	1	130	204	0	0	202	0	0.0	2	0	2	1
73	51	1	0	140	261	0	0	186	1	0.0	2	0	2	1
74	43	0	2	122	213	0	1	165	0	0.2	1	0	2	1
75	55	0	1	135	250	0	0	161	0	1.4	1	0	2	1
76	51	1	2	125	245	1	0	166	0	2.4	1	0	2	1
77	59	1	1	140	221	0	1	164	1	0.0	2	0	2	1
78	52	1	1	128	205	1	1	184	0	0.0	2	0	2	1
79	58	1	2	105	240	0	0	154	1	0.6	1	0	3	1
80	41	1	2	112	250	0	1	179	0	0.0	2	0	2	1
81	45	1	1	128	308	0	0	170	0	0.0	2	0	2	1
82	60	0	2	102	318	0	1	160	0	0.0	2	1	2	1
83	52	1	3	152	298	1	1	178	0	1.2	1	0	3	1
84	42	0	0	102	265	0	0	122	0	0.6	1	0	2	1
85	67	0	2	115	564	0	0	160	0	1.6	1	0	3	1
86	68	1	2	118	277	0	1	151	0	1.0	2	1	3	1
87	46	1	1	101	197	1	1	156	0	0.0	2	0	3	1
88	54	0	2	110	214	0	1	158	0	1.6	1	0	2	1
89	58	0	0	100	248	0	0	122	0	1.0	1	0	2	1
90	48	1	2	124	255	1	1	175	0	0.0	2	2	2	1
91	57	1	0	132	207	0	1	168	1	0.0	2	0	3	1
92	52	1	2	138	223	0	1	169	0	0.0	2	4	2	1
93	54	0	1	132	288	1	0	159	1	0.0	2	1	2	1
94	45	0	1	112	160	0	1	138	0	0.0	1	0	2	1
95	53	1	0	142	226	0	0	111	1	0.0	2	0	3	1
96	62	0	0	140	394	0	0	157	0	1.2	1	0	2	1
97	52	1	0	108	233	1	1	147	0	0.1	2	3	3	1
98	43	1	2	130	315	0	1	162	0	1.9	2	1	2	1
99	53	1	2	130	246	1	0	173	0	0.0	2	3	2	1
100	42	1	3	148	244	0	0	178	0	0.8	2	2	2	1
101	59	1	3	178	270	0	0	145	0	4.2	0	0	3	1
102	63	0	1	140	195	0	1	179	0	0.0	2	2	2	1
103	42	1	2	120	240	1	1	194	0	0.8	0	0	3	1
104	50	1	2	129	196	0	1	163	0	0.0	2	0	2	1
105	68	0	2	120	211	0	0	115	0	1.5	1	0	2	1
106	69	1	3	160	234	1	0	131	0	0.1	1	1	2	1

107	45	0	0	138	236	0	0	152	1	0.2	1	0	2	1
108	50	0	1	120	244	0	1	162	0	1.1	2	0	2	1
109	50	0	0	110	254	0	0	159	0	0.0	2	0	2	1
110	64	0	0	180	325	0	1	154	1	0.0	2	0	2	1
111	57	1	2	150	126	1	1	173	0	0.2	2	1	3	1
112	64	0	2	140	313	0	1	133	0	0.2	2	0	3	1
113	43	1	0	110	211	0	1	161	0	0.0	2	0	3	1
114	55	1	1	130	262	0	1	155	0	0.0	2	0	2	1
115	37	0	2	120	215	0	1	170	0	0.0	2	0	2	1
116	41	1	2	130	214	0	0	168	0	2.0	1	0	2	1
117	56	1	3	120	193	0	0	162	0	1.9	1	0	3	1
118	46	0	1	105	204	0	1	172	0	0.0	2	0	2	1
119	46	0	0	138	243	0	0	152	1	0.0	1	0	2	1
120	64	0	0	130	303	0	1	122	0	2.0	1	2	2	1
121	59	1	0	138	271	0	0	182	0	0.0	2	0	2	1
122	41	0	2	112	268	0	0	172	1	0.0	2	0	2	1
123	54	0	2	108	267	0	0	167	0	0.0	2	0	2	1
124	39	0	2	94	199	0	1	179	0	0.0	2	0	2	1
125	34	0	1	118	210	0	1	192	0	0.7	2	0	2	1
126	47	1	0	112	204	0	1	143	0	0.1	2	0	2	1
127	67	0	2	152	277	0	1	172	0	0.0	2	1	2	1
128	52	0	2	136	196	0	0	169	0	0.1	1	0	2	1
129	74	0	1	120	269	0	0	121	1	0.2	2	1	2	1
130	54	0	2	160	201	0	1	163	0	0.0	2	1	2	1
131	49	0	1	134	271	0	1	162	0	0.0	1	0	2	1
132	42	1	1	120	295	0	1	162	0	0.0	2	0	2	1
133	41	1	1	110	235	0	1	153	0	0.0	2	0	2	1
134	41	0	1	126	306	0	1	163	0	0.0	2	0	2	1
135	49	0	0	130	269	0	1	163	0	0.0	2	0	2	1
136	60	0	2	120	178	1	1	96	0	0.0	2	0	2	1
137	62	1	1	128	208	1	0	140	0	0.0	2	0	2	1
138	57	1	0	110	201	0	1	126	1	1.5	1	0	1	1
139	64	1	0	128	263	0	1	105	1	0.2	1	1	3	1
140	51	0	2	120	295	0	0	157	0	0.6	2	0	2	1
141	43	1	0	115	303	0	1	181	0	1.2	1	0	2	1
142	42	0	2	120	209	0	1	173	0	0.0	1	0	2	1
143	67	0	0	106	223	0	1	142	0	0.3	2	2	2	1
144	76	0	2	140	197	0	2	116	0	1.1	1	0	2	1
145	70	1	1	156	245	0	0	143	0	0.0	2	0	2	1
146	44	0	2	118	242	0	1	149	0	0.3	1	1	2	1
147	60	0	3	150	240	0	1	171	0	0.9	2	0	2	1
148	44	1	2	120	226	0	1	169	0	0.0	2	0	2	1
149	42	1	2	130	180	0	1	150	0	0.0	2	0	2	1
150	66	1	0	160	228	0	0	138	0	2.3	2	0	1	1
151	71	0	0	112	149	0	1	125	0	1.6	1	0	2	1
152	64	1	3	170	227	0	0	155	0	0.6	1	0	3	1
153	66	0	2	146	278	0	0	152	0	0.0	1	1	2	1
154	39	0	2	138	220	0	1	152	0	0.0	1	0	2	1
155	58	0	0	130	197	0	1	131	0	0.6	1	0	2	1
156	47	1	2	130	253	0	1	179	0	0.0	2	0	2	1
157	35	1	1	122	192	0	1	174	0	0.0	2	0	2	1
158	58	1	1	125	220	0	1	144	0	0.4	1	4	3	1
159	56	1	1	130	221	0	0	163	0	0.0	2	0	3	1
160	56	1	1	120	240	0	1	169	0	0.0	0	0	2	1
161	55	0	1	132	342	0	1	166	0	1.2	2	0	2	1
162	41	1	1	120	157	0	1	182	0	0.0	2	0	2	1
163	38	1	2	138	175	0	1	173	0	0.0	2	4	2	1
165	67	1	0	160	286	0	0	108	1	1.5	1	3	2	0
166	67	1	0	120	229	0	0	129	1	2.6	1	2	3	0
167	62	0	0	140	268	0	0	160	0	3.6	0	2	2	0
168	63	1	0	130	254	0	0	147	0	1.4	1	1	3	0
169	53	1	0	140	203	1	0	155	1	3.1	0	0	3	0
170	56	1	2	130	256	1	0	142	1	0.6	1	1	1	0
171	48	1	1	110	229	0	1	168	0	1.0	0	0	3	0
172	58	1	1	120	284	0	0	160	0	1.8	1	0	2	0
173	58	1	2	132	224	0	0	173	0	3.2	2	2	3	0
174	60	1	0	130	206	0	0	132	1	2.4	1	2	3	0
175	40	1	0	110	167	0	0	114	1	2.0	1	0	3	0
176	60	1	0	117	230	1	1	160	1	1.4	2	2	3	0
177	64	1	2	140	335	0	1	158	0	0.0	2	0	2	0
178	43	1	0	120	177	0	0	120	1	2.5	1	0	3	0
179	57	1	0	150	276	0	0	112	1	0.6	1	1	1	0
180	55	1	0	132	353	0	1	132	1	1.2	1	1	3	0
181	65	0	0	150	225	0	0	114	0	1.0	1	3	3	0
182	61	0	0	130	330	0	0	169	0	0.0	2	0	2	0
183	58	1	2	112	230	0	0	165	0	2.5	1	1	3	0
184	50	1	0	150	243	0	0	128	0	2.6	1	0	3	0
185	44	1	0	112	290	0	0	153	0	0.0	2	1	2	0
186	60	1	0	130	253	0	1	144	1	1.4	2	1	3	0
187	54	1	0	124	266	0	0	109	1	2.2	1	1	3	0
188	50	1	2	140	233	0	1	163	0	0.6	1	1	3	0

189	41	1	0	110	172	0	0	158	0	0.0	2	0	3	0
190	51	0	0	130	305	0	1	142	1	1.2	1	0	3	0
191	58	1	0	128	216	0	0	131	1	2.2	1	3	3	0
192	54	1	0	120	188	0	1	113	0	1.4	1	1	3	0
193	60	1	0	145	282	0	0	142	1	2.8	1	2	3	0
194	60	1	2	140	185	0	0	155	0	3.0	1	0	2	0
195	59	1	0	170	326	0	0	140	1	3.4	0	0	3	0
196	46	1	2	150	231	0	1	147	0	3.6	1	0	2	0
197	67	1	0	125	254	1	1	163	0	0.2	1	2	3	0
198	62	1	0	120	267	0	1	99	1	1.8	1	2	3	0
199	65	1	0	110	248	0	0	158	0	0.6	2	2	1	0
200	44	1	0	110	197	0	0	177	0	0.0	2	1	2	0
201	60	1	0	125	258	0	0	141	1	2.8	1	1	3	0
202	58	1	0	150	270	0	0	111	1	0.8	2	0	3	0
203	68	1	2	180	274	1	0	150	1	1.6	1	0	3	0
204	62	0	0	160	164	0	0	145	0	6.2	0	3	3	0
205	52	1	0	128	255	0	1	161	1	0.0	2	1	3	0
206	59	1	0	110	239	0	0	142	1	1.2	1	1	3	0
207	60	0	0	150	258	0	0	157	0	2.6	1	2	3	0
208	49	1	2	120	188	0	1	139	0	2.0	1	3	3	0
209	59	1	0	140	177	0	1	162	1	0.0	2	1	3	0
210	57	1	2	128	229	0	0	150	0	0.4	1	1	3	0
211	61	1	0	120	260	0	1	140	1	3.6	1	1	3	0
212	39	1	0	118	219	0	1	140	0	1.2	1	0	3	0
213	61	0	0	145	307	0	0	146	1	1.0	1	0	3	0
214	56	1	0	125	249	1	0	144	1	1.2	1	1	2	0
215	43	0	0	132	341	1	0	136	1	3.0	1	0	3	0
216	62	0	2	130	263	0	1	97	0	1.2	1	1	3	0
217	63	1	0	130	330	1	0	132	1	1.8	2	3	3	0
218	65	1	0	135	254	0	0	127	0	2.8	1	1	3	0
219	48	1	0	130	256	1	0	150	1	0.0	2	2	3	0
220	63	0	0	150	407	0	0	154	0	4.0	1	3	3	0
221	55	1	0	140	217	0	1	111	1	5.6	0	0	3	0
222	65	1	3	138	282	1	0	174	0	1.4	1	1	2	0
223	56	0	0	200	288	1	0	133	1	4.0	0	2	3	0
224	54	1	0	110	239	0	1	126	1	2.8	1	1	3	0
225	70	1	0	145	174	0	1	125	1	2.6	0	0	3	0
226	62	1	1	120	281	0	0	103	0	1.4	1	1	3	0
227	35	1	0	120	198	0	1	130	1	1.6	1	0	3	0
228	59	1	3	170	288	0	0	159	0	0.2	1	0	3	0
229	64	1	2	125	309	0	1	131	1	1.8	1	0	3	0
230	47	1	2	108	243	0	1	152	0	0.0	2	0	2	0
231	57	1	0	165	289	1	0	124	0	1.0	1	3	3	0
232	55	1	0	160	289	0	0	145	1	0.8	1	1	3	0
233	64	1	0	120	246	0	0	96	1	2.2	0	1	2	0
234	70	1	0	130	322	0	0	109	0	2.4	1	3	2	0
235	51	1	0	140	299	0	1	173	1	1.6	2	0	3	0
236	58	1	0	125	300	0	0	171	0	0.0	2	2	3	0
237	60	1	0	140	293	0	0	170	0	1.2	1	2	3	0
238	77	1	0	125	304	0	0	162	1	0.0	2	3	2	0
239	35	1	0	126	282	0	0	156	1	0.0	2	0	3	0
240	70	1	2	160	269	0	1	112	1	2.9	1	1	3	0
241	59	0	0	174	249	0	1	143	1	0.0	1	0	2	0
242	64	1	0	145	212	0	0	132	0	2.0	1	2	1	0
243	57	1	0	152	274	0	1	88	1	1.2	1	1	3	0
244	56	1	0	132	184	0	0	105	1	2.1	1	1	1	0
245	48	1	0	124	274	0	0	166	0	0.5	1	0	3	0
246	56	0	0	134	409	0	0	150	1	1.9	1	2	3	0
247	66	1	1	160	246	0	1	120	1	0.0	1	3	1	0
248	54	1	1	192	283	0	0	195	0	0.0	2	1	3	0
249	69	1	2	140	254	0	0	146	0	2.0	1	3	3	0
250	51	1	0	140	298	0	1	122	1	4.2	1	3	3	0
251	43	1	0	132	247	1	0	143	1	0.1	1	4	3	0
252	62	0	0	138	294	1	1	106	0	1.9	1	3	2	0
253	67	1	0	100	299	0	0	125	1	0.9	1	2	2	0
254	59	1	3	160	273	0	0	125	0	0.0	2	0	2	0
255	45	1	0	142	309	0	0	147	1	0.0	1	3	3	0
256	58	1	0	128	259	0	0	130	1	3.0	1	2	3	0
257	50	1	0	144	200	0	0	126	1	0.9	1	0	3	0
258	62	0	0	150	244	0	1	154	1	1.4	1	0	2	0
259	38	1	3	120	231	0	1	182	1	3.8	1	0	3	0
260	66	0	0	178	228	1	1	165	1	1.0	1	2	3	0
261	52	1	0	112	230	0	1	160	0	0.0	2	1	2	0
262	53	1	0	123	282	0	1	95	1	2.0	1	2	3	0
263	63	0	0	108	269	0	1	169	1	1.8	1	2	2	0
264	54	1	0	110	206	0	0	108	1	0.0	1	1	2	0
265	66	1	0	112	212	0	0	132	1	0.1	2	1	2	0
266	55	0	0	180	327	0	2	117	1	3.4	1	0	2	0
267	49	1	2	118	149	0	0	126	0	0.8	2	3	2	0
268	54	1	0	122	286	0	0	116	1	3.2	1	2	2	0
269	56	1	0	130	283	1	0	103	1	1.6	0	0	3	0

270	46	1	0	120	249	0	0	144	0	0.8	2	0	3	0
271	61	1	3	134	234	0	1	145	0	2.6	1	2	2	0
272	67	1	0	120	237	0	1	71	0	1.0	1	0	2	0
273	58	1	0	100	234	0	1	156	0	0.1	2	1	3	0
274	47	1	0	110	275	0	0	118	1	1.0	1	1	2	0
275	52	1	0	125	212	0	1	168	0	1.0	2	2	3	0
276	58	1	0	146	218	0	1	105	0	2.0	1	1	3	0
277	57	1	1	124	261	0	1	141	0	0.3	2	0	3	0
278	58	0	1	136	319	1	0	152	0	0.0	2	2	2	0
279	61	1	0	138	166	0	0	125	1	3.6	1	1	2	0
280	42	1	0	136	315	0	1	125	1	1.8	1	0	1	0
281	52	1	0	128	204	1	1	156	1	1.0	1	0	0	0
282	59	1	2	126	218	1	1	134	0	2.2	1	1	1	0
283	40	1	0	152	223	0	1	181	0	0.0	2	0	3	0
284	61	1	0	140	207	0	0	138	1	1.9	2	1	3	0
285	46	1	0	140	311	0	1	120	1	1.8	1	2	3	0
286	59	1	3	134	204	0	1	162	0	0.8	2	2	2	0
287	57	1	1	154	232	0	0	164	0	0.0	2	1	2	0
288	57	1	0	110	335	0	1	143	1	3.0	1	1	3	0
289	55	0	0	128	205	0	2	130	1	2.0	1	1	3	0
290	61	1	0	148	203	0	1	161	0	0.0	2	1	3	0
291	58	1	0	114	318	0	2	140	0	4.4	0	3	1	0
292	58	0	0	170	225	1	0	146	1	2.8	1	2	1	0
293	67	1	2	152	212	0	0	150	0	0.8	1	0	3	0
294	44	1	0	120	169	0	1	144	1	2.8	0	0	1	0
295	63	1	0	140	187	0	0	144	1	4.0	2	2	3	0
296	63	0	0	124	197	0	1	136	1	0.0	1	0	2	0
297	59	1	0	164	176	1	0	90	0	1.0	1	2	1	0
298	57	0	0	140	241	0	1	123	1	0.2	1	0	3	0
299	45	1	3	110	264	0	1	132	0	1.2	1	0	3	0
300	68	1	0	144	193	1	1	141	0	3.4	1	2	3	0
301	57	1	0	130	131	0	1	115	1	1.2	1	1	3	0
302	57	0	1	130	236	0	0	174	0	0.0	1	1	2	0