Import Libraries

In [23]:

```
import numpy as np
import pandas as pd
```

In [24]:

```
df = pd.read_csv('heart.csv')
```

Exploring the dataset

In [25]:

```
df.shape
```

Out[25]:

```
(303, 14)
```

In [26]:

```
df.head()
```

Out[26]:

	age	sex	cp	trestbps	chol	fbs	restecg	thalach	exang	oldpeak	slope	ca	thal	target
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

In [27]:

```
df.tail()
```

Out[27]:

	age	sex	cp	trestbps	chol	fbs	restecg	thalach	exang	oldpeak	slope	ca	thal	target
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

In [28]:

```
df.isnull().sum()
```

Out[28]:

```
age         0
sex         0
cp          0
trestbps    0
chol        0
fbs         0
restecg     0
thalach     0
exang       0
oldpeak     0
slope       0
ca          0
thal        0
target      0
dtype: int64
```

In [29]:

```
df.describe()
```

Out[29]:

	age	sex	cp	trestbps	chol	fbs	restecg	thalach	exang	oldp
count	303.000000	303.000000	303.000000	303.000000	303.000000	303.000000	303.000000	303.000000	303.000000	303.000
mean	54.366337	0.683168	0.966997	131.623762	246.264026	0.148515	0.528053	149.646865	0.326733	1.039
std	9.082101	0.466011	1.032052	17.538143	51.830751	0.356198	0.525860	22.905161	0.469794	1.161
min	29.000000	0.000000	0.000000	94.000000	126.000000	0.000000	0.000000	71.000000	0.000000	0.000
25%	47.500000	0.000000	0.000000	120.000000	211.000000	0.000000	0.000000	133.500000	0.000000	0.000
50%	55.000000	1.000000	1.000000	130.000000	240.000000	0.000000	1.000000	153.000000	0.000000	0.800
75%	61.000000	1.000000	2.000000	140.000000	274.500000	0.000000	1.000000	166.000000	1.000000	1.600
max	77.000000	1.000000	3.000000	200.000000	564.000000	1.000000	2.000000	202.000000	1.000000	6.200

In [30]:

```
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 303 entries, 0 to 302
Data columns (total 14 columns):
 #   Column    Non-Null Count  Dtype  
---  ------    --------------  -----  
 0   age       303 non-null    int64  
 1   sex       303 non-null    int64  
 2   cp        303 non-null    int64  
 3   trestbps  303 non-null    int64  
 4   chol      303 non-null    int64  
 5   fbs       303 non-null    int64  
 6   restecg   303 non-null    int64  
 7   thalach   303 non-null    int64  
 8   exang     303 non-null    int64  
 9   oldpeak   303 non-null    float64
 10  slope     303 non-null    int64  
 11  ca        303 non-null    int64  
 12  thal      303 non-null    int64  
 13  target    303 non-null    int64  
dtypes: float64(1), int64(13)
memory usage: 33.3 KB
```

Data Visualization

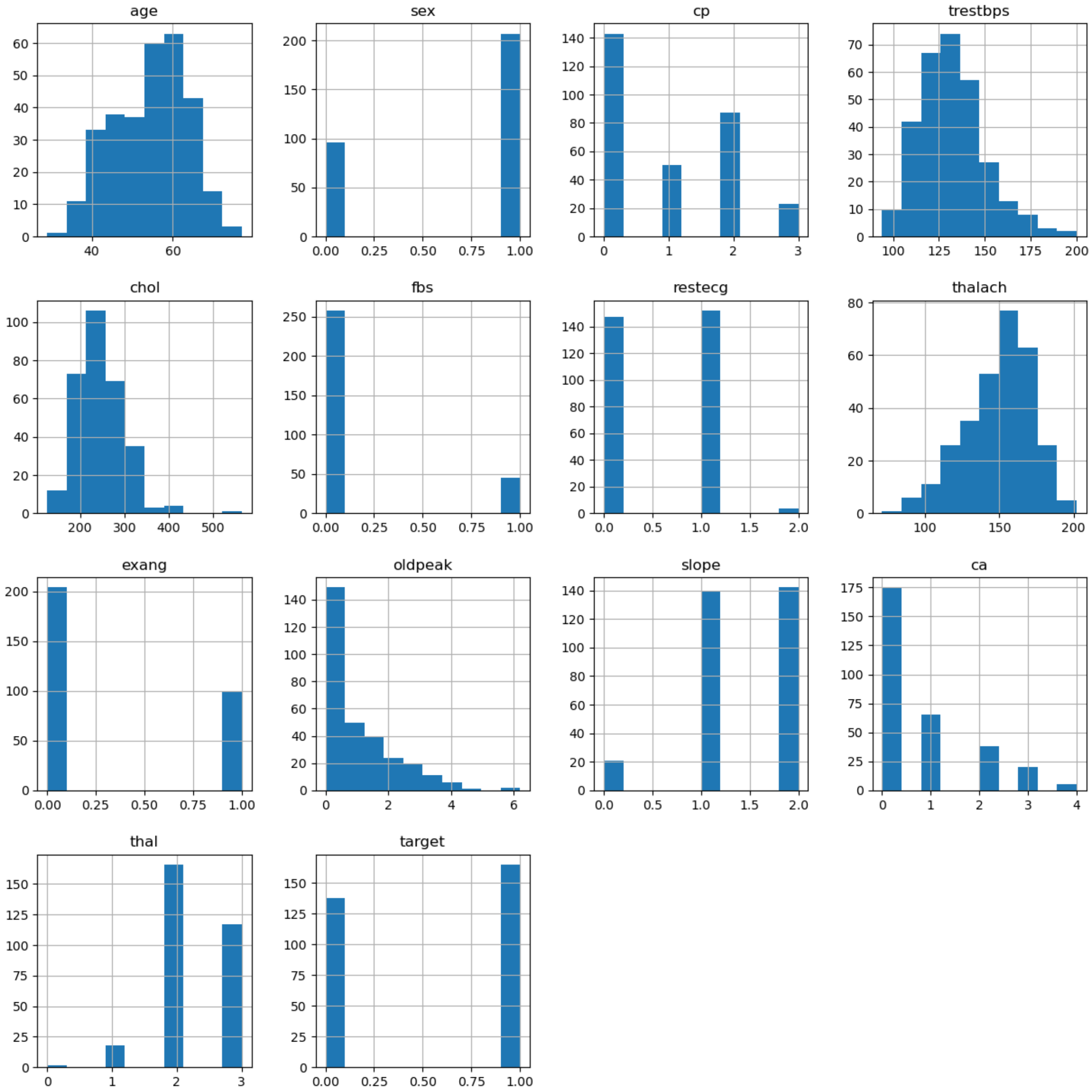
In [31]:

```
import matplotlib.pyplot as plt
%matplotlib inline
import seaborn as sns
```

In [32]:

```
fig = plt.figure(figsize = (15,15))
ax = fig.gca()
g = df.hist(ax=ax)
```

```
C:\Users\adity\AppData\Local\Temp\ipykernel_26636\1052144078.py:3: UserWarning: To output multiple
subplots, the figure containing the passed axes is being cleared.
  g = df.hist(ax=ax)
```

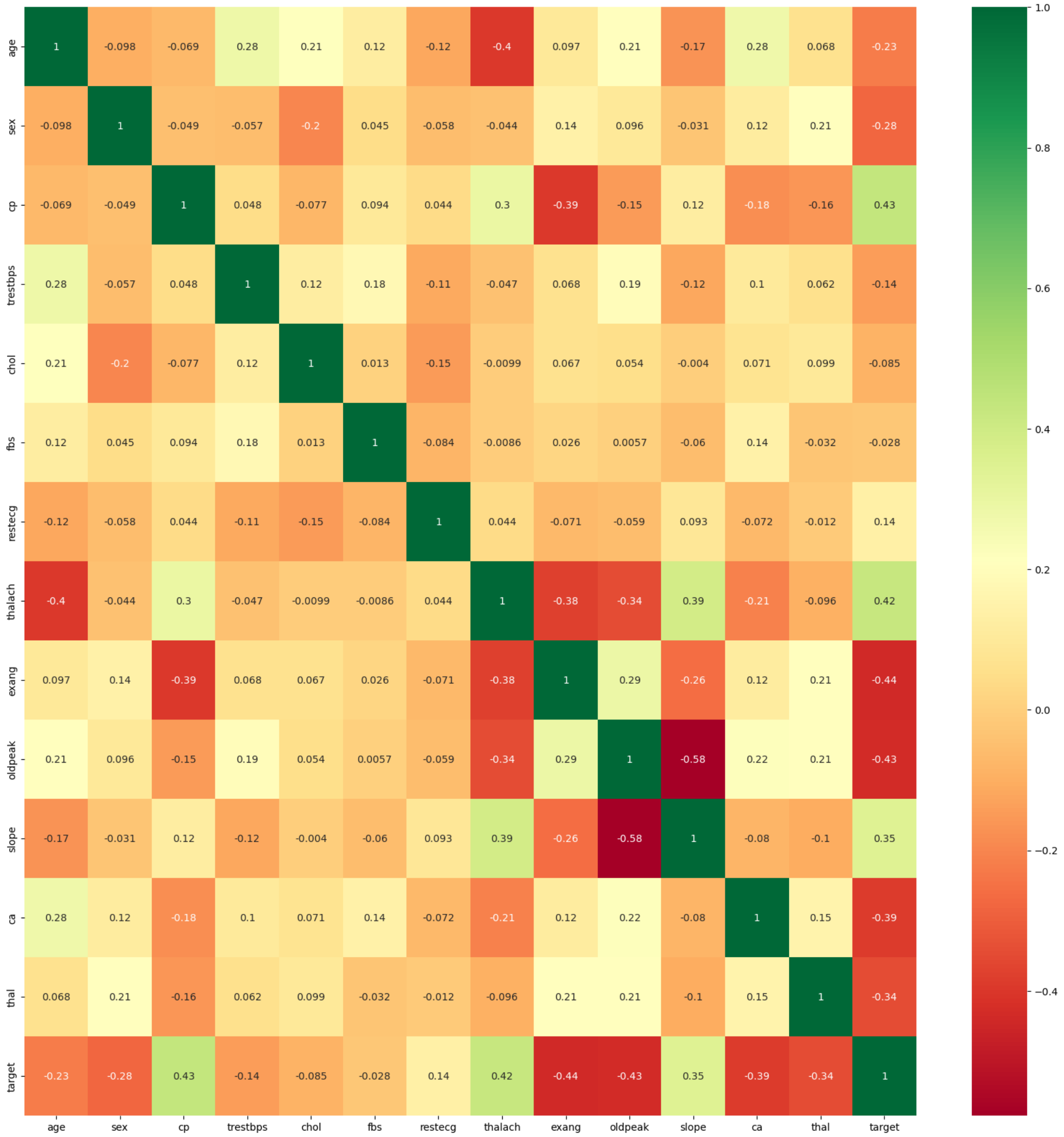


Corelation Map

In [33]:
```
corr_matrix = df.corr()
top_corr_features = corr_matrix.index

# Plotting the heatmap
plt.figure(figsize=(20,20))
sns.heatmap(data=df[top_corr_features].corr(), annot=True, cmap='RdYlGn')
```

Out[33]:
```
<Axes: >
```



In [34]:
```
dataset = pd.get_dummies(df, columns=['sex', 'cp', 'fbs', 'restecg', 'exang', 'slope', 'ca', 'thal'])
```

In [35]:
```
from sklearn.preprocessing import StandardScaler
standScaler = StandardScaler()
columns_to_scale = ['age', 'trestbps', 'chol', 'thalach', 'oldpeak']
dataset[columns_to_scale] = standScaler.fit_transform(dataset[columns_to_scale])
```

In [36]:
```
dataset.head()
```

Out[36]:

	age	trestbps	chol	thalach	oldpeak	target	sex_0	sex_1	cp_0	cp_1	...	slope_2	ca_0	ca_1	ca_2	ca
0	0.952197	0.763956	-0.256334	0.015443	1.087338	1	0	1	0	0	...	0	1	0	0	
1	-1.915313	-0.092738	0.072199	1.633471	2.122573	1	0	1	0	0	...	0	1	0	0	
2	-1.474158	-0.092738	-0.816773	0.977514	0.310912	1	1	0	0	1	...	1	1	0	0	
3	0.180175	-0.663867	-0.198357	1.239897	-0.206705	1	0	1	0	1	...	1	1	0	0	
4	0.290464	-0.663867	2.082050	0.583939	-0.379244	1	1	0	1	0	...	1	1	0	0	

5 rows × 31 columns

In [37]:
```
X = dataset.drop('target', axis=1)
y = dataset['target']
```

Modelling

In [38]:
```
from sklearn.neighbors import KNeighborsClassifier
from sklearn.model_selection import cross_val_score
```

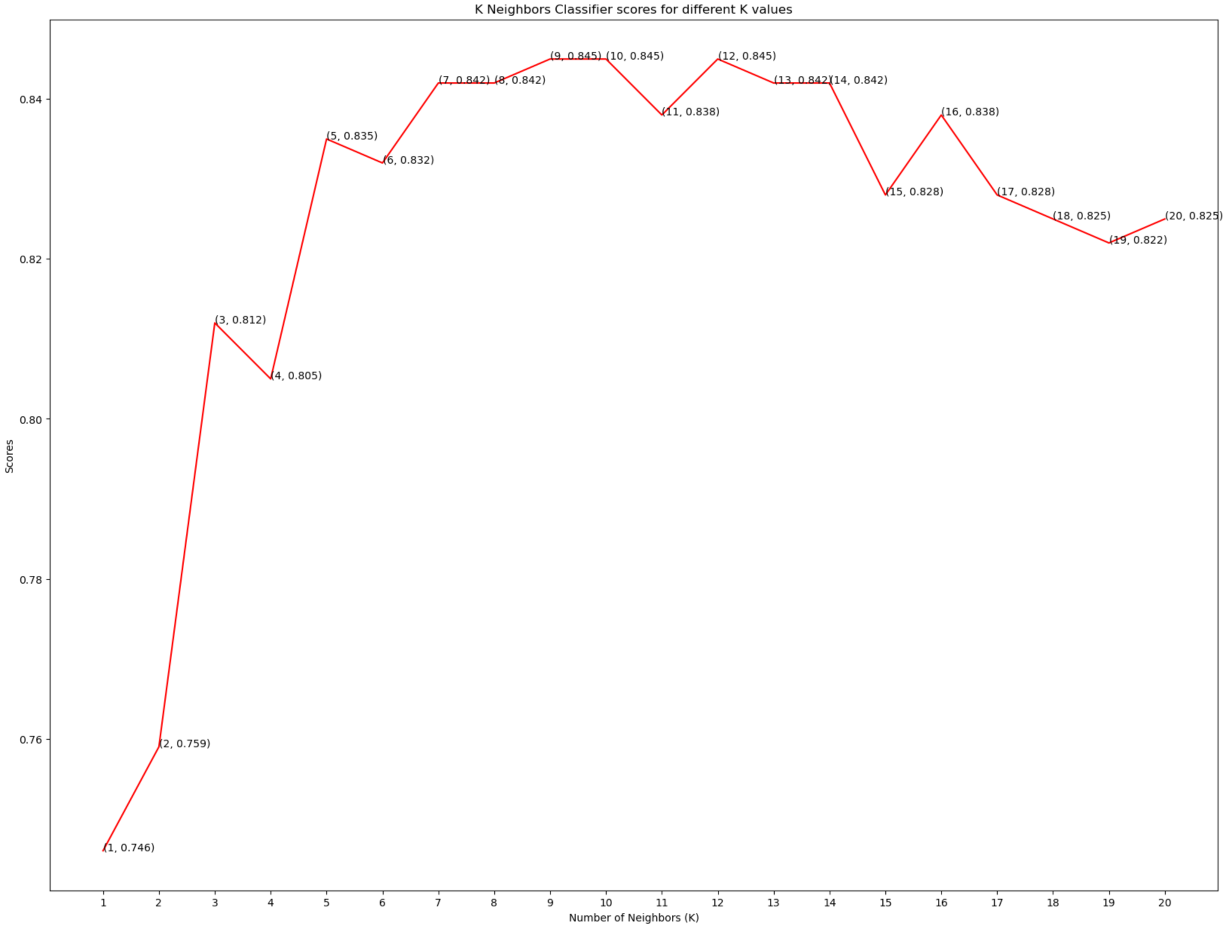
In [39]:
```
knn_scores = []
for i in range(1, 21):
  knn_classifier = KNeighborsClassifier(n_neighbors=i)
  cvs_scores = cross_val_score(knn_classifier, X, y, cv=10)
  knn_scores.append(round(cvs_scores.mean(),3))
```

In [40]:

```
# Plotting the results of knn_scores
plt.figure(figsize=(20,15))
plt.plot([k for k in range(1, 21)], knn_scores, color = 'red')
for i in range(1,21):
    plt.text(i, knn_scores[i-1], (i, knn_scores[i-1]))
plt.xticks([i for i in range(1, 21)])
plt.xlabel('Number of Neighbors (K)')
plt.ylabel('Scores')
plt.title('K Neighbors Classifier scores for different K values')
```

Out[40]:

```
Text(0.5, 1.0, 'K Neighbors Classifier scores for different K values')
```



In [41]:

```
# Training the knn classifier model with k value as 12
knn_classifier = KNeighborsClassifier(n_neighbors=12)
cvs_scores = cross_val_score(knn_classifier, X, y, cv=10)
print("KNeighbours Classifier Accuracy with K=12 is: {}%".format(round(cvs_scores.mean(), 4)*100))
```

```
KNeighbours Classifier Accuracy with K=12 is: 84.48%
```