80 Interview Questions on Python for Data Science

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Python — 34 questions

1. How do we create numerical variables in python?

```
pi = 3.14159

diameter = 3
```

2. How do we perform calculations in python?

```
radius = diameter / 2

area = pi * radius * radius
```

3. Give an example of BODMAS in python?

```
(8–3) * (2 — (1 + 1))

The output is 0
```

4. Give examples of list?

```
a = [1, 2, 3] → length of a : 3
```

b = [1, [2, 3]] → length of b : 2

c = [] → length of c : 0

d = [1, 2, 3][1:] → length of d : 2

5. How do we interchange the values of two lists?

a = [1, 2, 3]

b = [3, 2, 1]

b,a = a,b

6. How do we extract values from list?

r = [“Mario”, “Bowser”, “Luigi”]

r[0] → Mario

r[-1] → Luigi

7. How we create loops in python using list?

The following code returns the numbers from a list that are more than the threshold

```
def elementwise_greater_than(L, thresh):

res = []

for ele in L:

if ele > thresh: res.append()

return res

elementwise_greater_than([1, 2, 3, 4], 2)
```

The output is [3, 4]

8. Give examples of String?

a = “” → length of a : 0

b = “it’s ok” → length of b : 7

> *c = 'it\'s ok' → length of c : 7*
>
> *d = """hey""" → length of d : 3*
>
> *e = '\n' → length of e : 1*

9. Give an example of Boolean?

> *A Boolean takes only 2 values: True and False*
>
> *0 < 1: True*
>
> *0 > 1: False*

10. How do we perform operations on Boolean?

OR operations	AND operations
True or True: True	True and True: True
True or False: True	True and False: False
False or False: False	False and False: False

11. What are function in python?

> *A function is a block of organized, reusable code that is used to perform a single, related action.*
>
> *def round_to_two_places(num):*
>
> *return round(num, 2)*
>
> *pi = round_to_two_places(3.14159)*
>
> *The output is 3.14*

12. Calculating remainder in python?

> *91 % 3*
>
> *The output is 1*

13. Who created python?

> *Python is an interpreted, high-level, general-purpose programming language.*
>
> *Python was created by Guido van Rossum*

14. When was python created?

> *Python was conceived in the late 1980s as a successor to the ABC language*
>
> *The first version was releases in 1991*
>
> *Python 2.0 was released in 2000*
>
> *Python 3.0 was released in 2008*

15. What are the built-in type does python provides?

Mutable	Immutable
List	Strings
Sets	Tuples
Dictionaries	Numbers

16. What is lambda in Python?

> *It is a single expression anonymous function used as inline function.*
>
> *x = lambda a : a + 10*
>
> *x(5)*
>
> *The output is 15*

17. What is pass in Python?

> *Pass means, no-operation Python statement.*
>
> *It is a place holder in compound statement, where nothing has to be written.*

18. What is slicing?

> *A mechanism to select a range of items from sequence types like list, tuple, strings etc. is known as slicing.*
>
> *x[1, 2, 3, 4, 5]*
>
> *x[0:2] → [1,2]*
>
> *x[2:] → [3,4,5]*

19. What is negative index in Python?

> *Python sequences can be index in positive and negative numbers.*
>
> *For positive index, 0 is the first index, 1 is the second index and so forth.*
>
> *For negative index, (-1) is the last index and (-2) is the second last index and so forth.*

20. How you can convert a number to a string?

> *In order to convert a number into a string, use the inbuilt function str().*
>
> *If you want a octal or hexadecimal representation, use the inbuilt function oct() or hex().*

21. What is range function?

> *The range() function returns a sequence of numbers, starting from 0 by default, and increments by 1 (by default), and stops before a specified number.*
>
> *x = range(6)*
>
> *for n in x:*
>
> *print(n)*
>
> *The output is 0, 1, 2, 3, 4, 5*

22. How do you generate random numbers in Python?

> ***Library:*** *import random*
>
> ***Syntax:*** *random.random()*
>
> ***Output:*** *Returns a random floating point number in the range [0,1)*

23. What is the difference between / and // operator in Python?

> *// is a Floor Division operator*
>
> *It is used for dividing two operands with the result as quotient showing only digits before the decimal point.*
>
> *10 / 3 = 3.33333*
>
> *10 // 3 = 3*

24. What is the use of the split function in Python?

> *The use of the split function in Python is that it breaks a string into shorter strings using the defined separator.*
>
> *It gives a list of all words present in the string.*

25. What is the difference between a list and a tuple?

List	Tuple
• A list consists of mutable objects. (Objects which can be changed after creation) • List is stored in two blocks of memory (One is fixed sized and the other is variable sized for storing data) • An element in a list can be removed or replaced	• A tuple consists of immutable objects. (Objects which cannot change after creation) • Tuple is stored in a single block of memory. • An element in a tuple cannot be removed or replaced.

26. What is the difference between an array and a list?

List	Array
• Python lists are very flexible and can hold arbitrary data • Lists are a part of Python's syntax, so they do not need to be declared first. • Lists can hold heterogeneous data. • Mathematical functions cannot be directly applied to lists. Instead, they have to be individually applied to each element.	• Python arrays are just a thin wrapper on C arrays. • Arrays need to first be imported, or declared, from other libraries (i.e. numpy). • Arrays can only store homogenous data. • Arrays are specially optimized for arithmetic computations.

27. How would you convert a list to an array?

> *This is done using numpy.array().*
>
> *This function of the numpy library takes a list as an argument and returns an array that contains all the elements of the list.*

28. What are the advantages of NumPy arrays over Python lists?

> *NumPy is more convenient.*
>
> *You get a lot of vector and matrix operations, which sometimes allow one to avoid unnecessary work.*
>
> *You get a lot built in functions with NumPy for fast searching, basic statistics, linear algebra, histograms, etc.*

29. What are global and local variables in Python?

Global Variables	Local Variables
• Variables declared outside a function or in global space are called global variables. • These variables can be accessed by any function in the program.	• Any variable declared inside a function is known as a local variable. • This variable is present in the local space and not in the global space.

30. Explain the differences between Python 2 and Python 3?

	Python 2	Python 3
String Encoding	Python 2 stores them as ASCII. Unicode is a superset of ASCII	Python 3 stores strings as Unicode by default.
Division	Division applies the floor function to the decimal output and returns an integer. So dividing 5 by 2 would return 2	Division in Python 3 returns the expected output, even if it is in decimals
Printing	Python 2 does not require parentheses	Python 3 requires parentheses around what is to be printed

31. What is dictionary comprehension in Python?

> *Dictionary comprehension is one way to create a dictionary in Python.*
>
> *It creates a dictionary by merging two sets of data which are in the form of either lists or arrays.*
>
> *rollNumbers =[122, 233, 353, 456]*
>
> *names = [‘alex’, ‘bob’, ‘can’, ‘don’]*
>
> *NewDictionary={ i:j for (i,j) in zip (rollNumbers,names)}*
>
> *The output is {(122, ‘alex’), (233, ‘bob’), (353, ‘can’), (456, ‘don’)*

32. How would you sort a dictionary in Python?

> ***Dictionary.keys() :*** *Returns only the keys in an arbitrary order.*
>
> ***Dictionary.values() :*** *Returns a list of values.*
>
> ***Dictionary.items() :*** *Returns all of the data as a list of key-value pairs.*
>
> ***Sorted():*** *This method takes one mandatory and two optional arguments*

33. How do you reverse a string in Python?

> *Stringname = ‘python’*
>
> *Stringname[::-1]*
>
> *The output is ‘nohtyp’*

34. How do you check if a Python string contains another string?

> *“Python Programming”* ***contains*** *“Programming”*
>
> *The output is True*

> *“Python Programming”* ***contains*** *“Language”*
>
> *The output is False*

Pandas — 18 questions

35. How to create dataframe from list?

```
fruit_sales = pd.DataFrame([[35, 21], [41, 34]], columns=['Apples', 'Bananas'],index=['2017 Sales', '2018 Sales'])
```

	Apples	Bananas
2017 Sales	35	21
2018 Sales	41	34

36. How to create dataframe from dictionary?

```
animals = pd.DataFrame({'Cows': [12, 20], 'Goats': [22, 19]}, index=['Year 1', 'Year 2'])
```

	Cows	Goats
Year 1	12	22
Year 2	20	19

37. How to import csv?

```
import pandas as pd

cr_data = pd.read_csv("credit_risk_dataset.csv")
```

38. How to export csv?

```
import pandas as pd

animals.to_csv("cows_and_goats.csv")
```

39. How do you select columns from dataframe?

```
Selecting the 'description' column from 'reviews' dataframe

reviews['description']
```

40. How do you select rows from dataframe?

> *Selecting the first row from 'reviews' dataframe*
>
> *reviews.iloc[0]*

41. How do you select both rows and columns from dataframe?

> *Selecting the first row of 'description' column from 'reviews' dataframe*
>
> *reviews['description'].iloc[0]*

42. How do you select rows based on indices?

> *Selecting rows 1, 2, 3, 5 and 8 from 'reviews' dataframe*
>
> *indices = [1, 2, 3, 5, 8]*
>
> *sample_reviews = reviews.loc[indices]*

43. How do you find the median value?

> *Finding the median of 'points' column from 'reviews' dataframe*
>
> *reviews['points'].median()*

44. How do you find the unique values?

> *Finding all the unique countries in 'country' column from 'reviews' dataframe*
>
> *reviews['country'].unique()*

45. How do you find count of unique values?

> *Finding the count of unique countries in 'country' column from 'reviews' dataframe*
>
> *reviews['country'].value_counts()*

```
US          54504
France      22093
Italy       19540
Spain        6645
Portugal     5691
Chile        4472
Argentina    3800
Austria      3345
```

46. How do you group on a particular variable?

> *Find the count of 'taster_twitter_handle' column from 'reviews' dataframe*
>
> *reviews.groupby('taster_twitter_handle').size()*

47. How do you apply functions after grouping on a particular variable?

> *Find the min and max of 'price' for different 'variety' column from 'reviews' dataframe*
>
> *reviews.groupby('variety').['price'].agg([min, max])*

variety	min	max
Abouriou	15.0	75.0
Agiorgitiko	10.0	66.0
Aglianico	6.0	180.0
Aidani	27.0	27.0
Airen	8.0	10.0

48. How to get the data type of a particular variable?

> *Get the data type of 'points' column from 'reviews' dataframe*
>
> *reviews['points'].dtype*

49. How do you drop columns?

> *Dropping columns 'points' and 'country' from 'reviews' dataframe*
>
> *reviews.drop(['points', 'country'], axis=1, inplace=True)*

50. How do you keep columns?

> *Keeping columns 'points' and 'country' from 'reviews' dataframe*
>
> *reviews = reviews[['points', 'country']]*

51. How do you rename a column?

> *Rename 'region_1' as 'region' and 'region_2' as 'locale'*

```
reviews.rename(columns=dict(region_1='region', region_2='locale'))
```

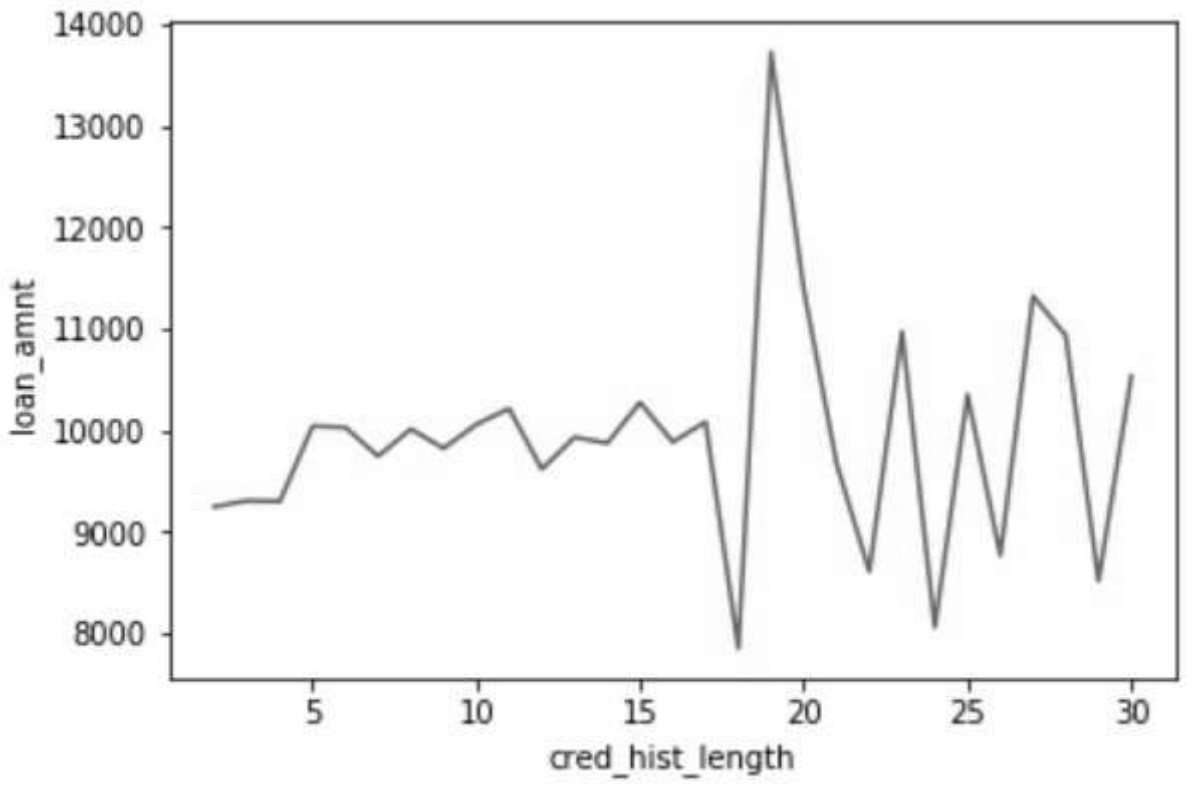
52. How do you sort a dataframe based on a variable?

```
Sorting 'region_1' in descending order

reviews['region_1'].sort_values(ascending=False)
```

Visualization — 8 questions

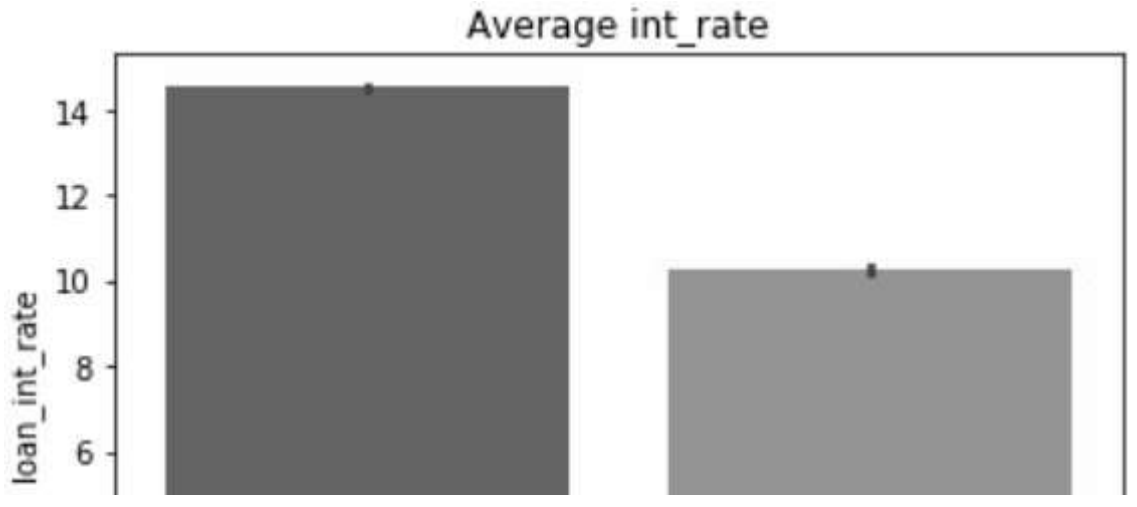
53. How do you plot a line chart?

```
import seaborn as sns

sns.lineplot(data=loan_amnt)
```



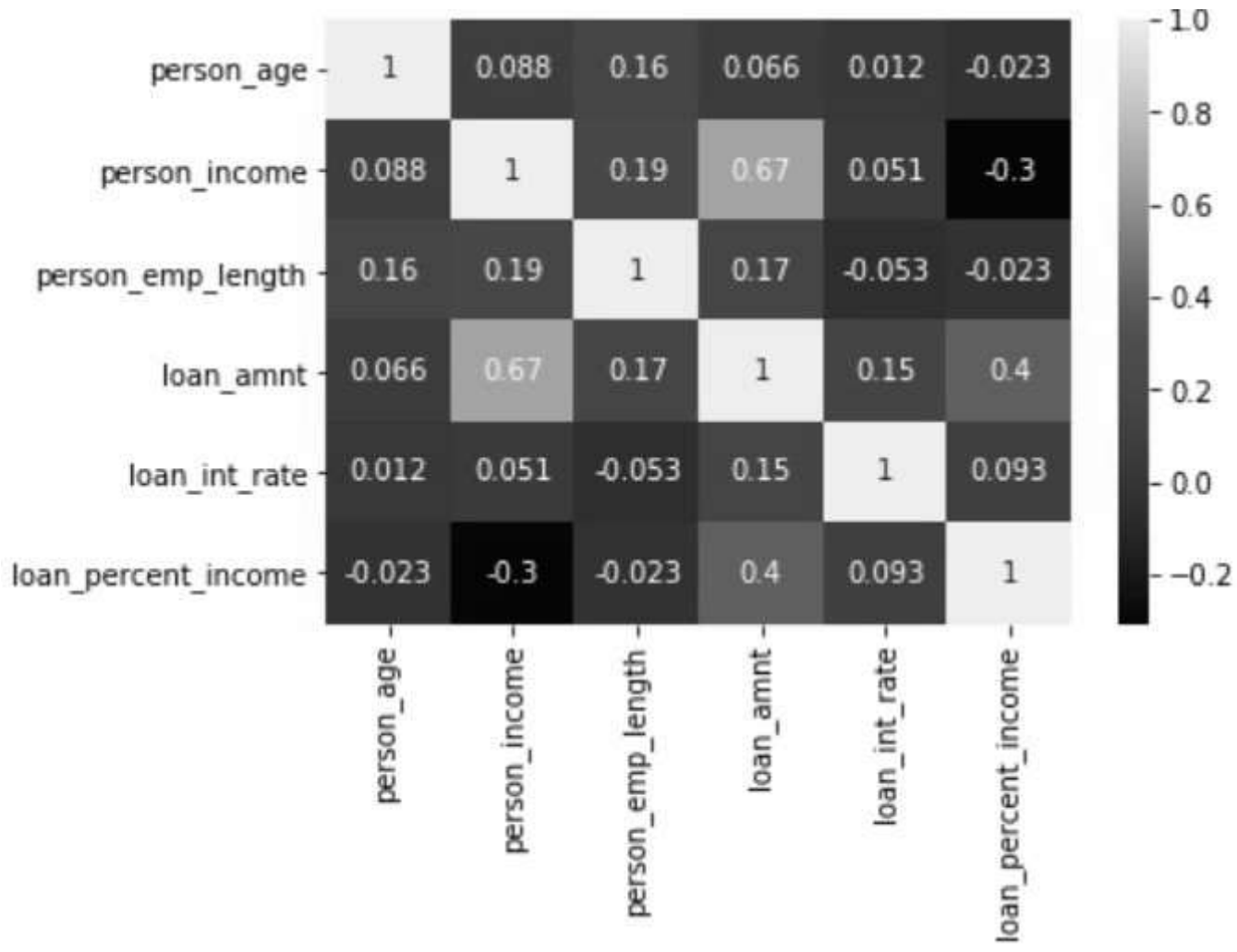
54. How do you plot a bar chart?

```
import seaborn as sns

sns.barplot(x=cr_data['cb_person_default_on_file'],
y=cr_data['loan_int_rate'])
```



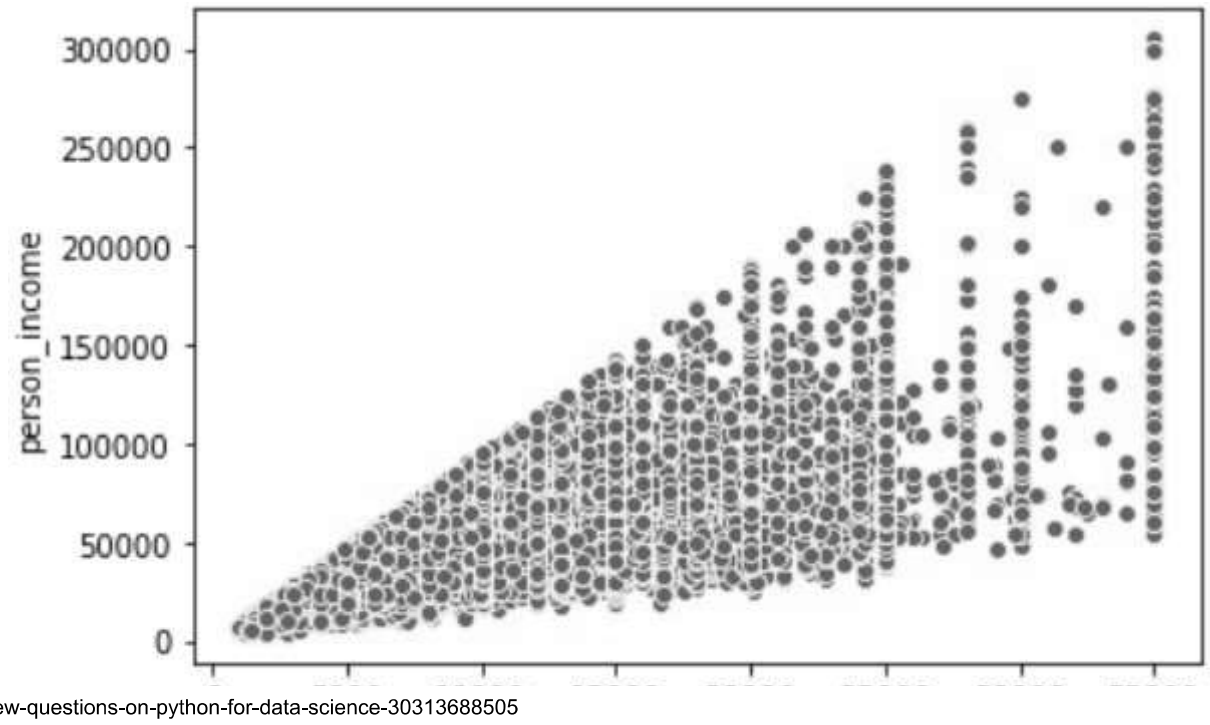
55. How do you plot heat map?

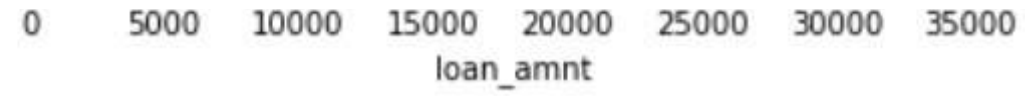
```
import seaborn as sns

sns.heatmap(num_data.corr(), annot=True)
```



56. How do you plot scatter plot?

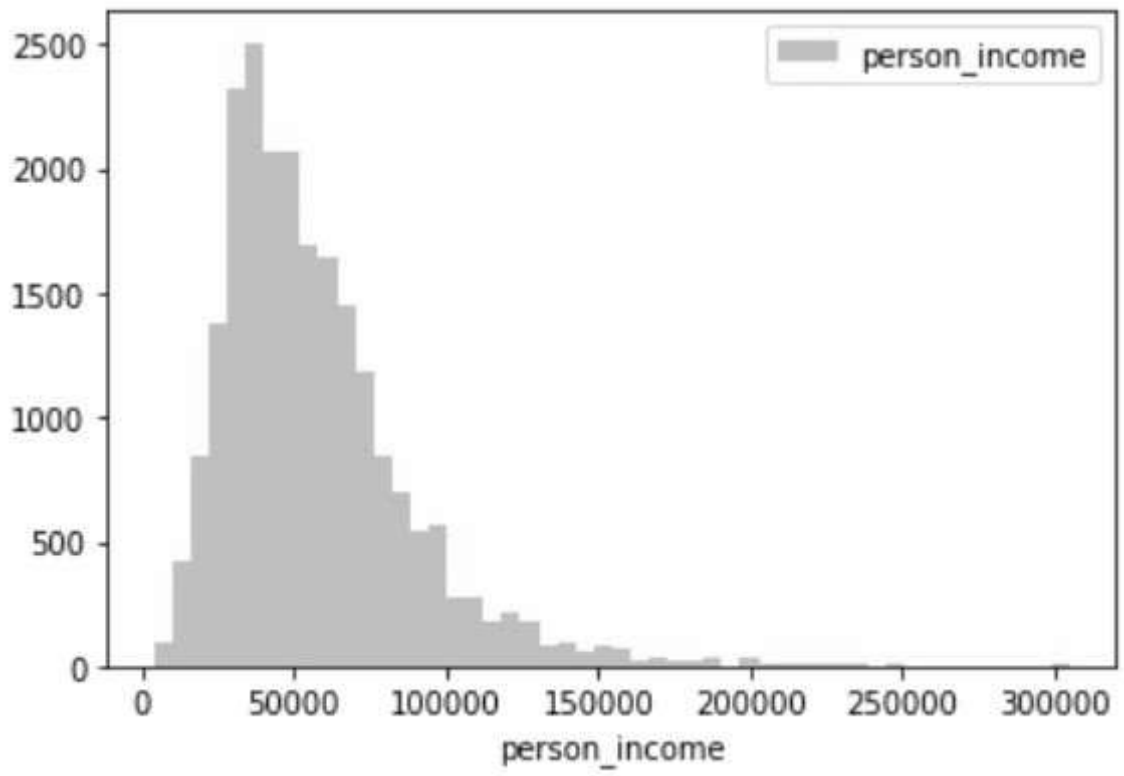
```
import seaborn as sns

sns.scatterplot(x=cr_data['loan_amnt'], y=cr_data['person_income'])
```





57. How do you plot distribution chart?

```
import seaborn as sns

sns.distplot(a=cr_data['person_income'], label="person_income", kde=False)
```



58. How do you add x-label and y-label to the chart?

```
import matplotlib.pyplot as plt

plt.xlabel("cred_hist_length")

plt.ylabel("loan_amnt")
```

59. How do you add title to the chart?

```
import matplotlib.pyplot as plt

plt.title("Average int_rate")
```

60. How do you add legend to chart?

```
import matplotlib.pyplot as plt

plt.legend()
```

Data Cleaning — 5 questions

61. How do you identify missing values?

> *The function used to identify the missing value is through .isnull()*
>
> *The code below gives the total number of missing data points in the data frame*
>
> *missing_values_count = sf_permits.isnull().sum()*

62. How do you impute missing values value imputation?

> *Replace missing values with zero / mean*
>
> *df['income'].fillna(0)*
>
> *df['income'] = df['income'].fillna((df['income'].mean()))*

63. What is scaling of data?

> ***Scaling convert the data using the formula = (value — min value) / (max value — min value)***
>
> *from sklearn.preprocessing import MinMaxScaler*
>
> *scaler = MinMaxScaler()*
>
> *original_data = pd.DataFrame(kickstarters_2017['usd_goal_real'])*
>
> *scaled_data = pd.DataFrame(scaler.fit_transform(original_data))*
>
> ***Original data***
>
> *Minimum value: 0.01*
>
> *Maximum value: 166361390.71*
>
> ***Scaled data***
>
> *Minimum value: 0.0*
>
> *Maximum value: 1.0*

64. What is normalizing of data?

> ***Scaling convert the data using the formula = (value — mean) / standard deviation***

```
from sklearn.preprocessing import StandardScaler

scaler = StandardScaler()

original_data = pd.DataFrame(kickstarters_2017['usd_goal_real'])

scaled_data = pd.DataFrame(scaler.fit_transform(original_data))
```

Original data

Minimum value: 0.01

Maximum value: 166361390.71

Scaled data

Minimum value: -0.10

Maximum value: 212.57

65. How do you treat dates in python?

```
To convert dates from String to Date

import datetime

import pandas as pd

df['Date_parsed'] = pd.to_datetime(df['Date'], format="%m/%d/%Y")
```

Machine Learning — 15 questions

66. What is logistic regression?

> *Logistic regression is a machine learning algorithm for classification. In this algorithm, the probabilities describing the possible outcomes of a single trial are modelled using a logistic function.*

67. What is the syntax for logistic regression?

Library: *sklearn.linear_model.LogisticRegression*

Define model: *lr = LogisticRegression()*

Fit model: *model = lr.fit(x, y)*

> ***Predictions:*** *pred = model.predict_proba(test)*

68. How do you split the data in train / test?

> ***Library:*** *sklearn.model_selection.train_test_split*
>
> ***Syntax:*** *X_train, X_test, y_train, y_test = train_test_split(X, y, test_size=0.33, random_state=42)*

69. What is decision tree?

> *Given a data of attributes together with its classes, a decision tree produces a sequence of rules that can be used to classify the data.*

70. What is the syntax for decision tree classifier?

> ***Library:*** *sklearn.tree.DecisionTreeClassifier*
>
> ***Define model:*** *dtc = DecisionTreeClassifier()*
>
> ***Fit model:*** *model = dtc.fit(x, y)*
>
> ***Predictions:*** *pred = model.predict_proba(test)*

71. What is random forest?

> *Random forest classifier is a meta-estimator that fits a number of decision trees on various sub-samples of datasets and uses average to improve the predictive accuracy of the model and controls over-fitting. The sub-sample size is always the same as the original input sample size but the samples are drawn with replacement.*

72. What is the syntax for random forest classifier?

> ***Library:*** *sklearn.ensemble.RandomForestClassifier*
>
> ***Define model:*** *rfc = RandomForestClassifier()*
>
> ***Fit model:*** *model = rfc.fit(x, y)*
>
> ***Predictions:*** *pred = model.predict_proba(test)*

73. What is gradient boosting?

> *Gradient boosting is a machine learning technique for regression and classification problems, which produces a prediction model in the form of an ensemble of weak prediction models, typically decision trees. It builds the*

> *model in a stage-wise fashion like other boosting methods do, and it generalizes them by allowing optimization of an arbitrary differentiable loss function.*

74. What is the syntax for gradient boosting classifier?

> ***Library:*** *sklearn.ensemble.GradientBoostingClassifier*
>
> ***Define model:*** *gbc = GradientBoostingClassifier()*
>
> ***Fit model:*** *model = gbc.fit(x, y)*
>
> ***Predictions:*** *pred = model.predict_proba(test)*

75. What is SVM?

> *Support vector machine is a representation of the training data as points in space separated into categories by a clear gap that is as wide as possible. New examples are then mapped into that same space and predicted to belong to a category based on which side of the gap they fall.*

76. What is the difference between KNN and KMeans?

> ***KNN:***
>
> *Supervised classification algorithm*
>
> *Classifies new data points accordingly to the k number or the closest data points*
>
> ***KMeans:***
>
> *Unsupervised clustering algorithm*
>
> *Groups data into k number of clusters.*

77. How do you treat categorical variables?

> *Replace categorical variables with the average of target for each category*

Gender	Y	Gender_Y
M	1	0.33
F	1	0.67
M	0	0.33
F	0	0.67
M	0	0.33

F	1	0.67

> *One hot encoding*

Gender	Y	Gender_M	Gender_F
M	1	1	0
F	1	0	1
M	0	1	0
F	0	0	1
M	0	1	0
F	1	0	1

78. How do you treat missing values?

> ***Drop rows having missing values***
>
> *DataFrame.dropna(axis=0, how='any', inplace=True)*
>
> ***Drop columns***
>
> *DataFrame.dropna(axis=1, how='any', inplace=True)*
>
> ***Replace missing values with zero / mean***
>
> *df['income'].fillna(0)*
>
> *df['income'] = df['income'].fillna((df['income'].mean()))*

79. How do you treat outliers?

> *Inter quartile range is used to identify the outliers.*
>
> *Q1 = df['income'].quantile(0.25)*
>
> *Q3 = df['income'].quantile(0.75)*
>
> *IQR = Q3 — Q1*
>
> *df = df[(df['income'] >= (Q1–1.5 * IQR)) & (df['income'] <= (Q3 + 1.5 * IQR))]*

80. What is bias / variance trade off?

> ***Definition***

The Bias-Variance Trade off is relevant for supervised machine learning, specifically for predictive modelling. It's a way to diagnose the performance of an algorithm by breaking down its prediction error.

Error from Bias

Bias is the difference between your model's expected predictions and the true values.

This is known as under-fitting.

Does not improve with collecting more data points.

Error from Variance

Variance refers to your algorithm's sensitivity to specific sets of training data.

This is known as over-fitting.

Improves with collecting more data points.

Python Interview Data Science Machine Learning