## 2347138 P9

#### September 20, 2023

```
[]: import pandas as pd
     import csv
     data = pd.read_csv("D:\PRATHAM FILES\Web design Project\Python_
      →new\studentsdetails.csv")
     print(data.head(20))
         YearofStudy
                                          Course
                                                   Age
                                                         ApproxHeight
                                                                        ApproxWeight
                                                                                       \
    0
         Second Year
                                     MATHEMATICS
                                                    20
                                                                  152
                                                                                   80
    1
          First Year
                       ECONOMICS AND STATISTICS
                                                    29
                                                                  182
                                                                                   79
    2
         Fourth Year
                                                    22
                                                                                   64
                                     MATHEMATICS
                                                                   167
    3
         Second Year
                       ECONOMICS AND STATISTICS
                                                    23
                                                                   149
                                                                                   52
         Second Year
    4
                                     MATHEMATICS
                                                    18
                                                                                   70
                                                                   150
    5
          Third Year
                                  URBAN PLANNING
                                                    20
                                                                  154
                                                                                   56
    6
          Third Year
                                     MATHEMATICS
                                                    21
                                                                  165
                                                                                   79
    7
          Third Year
                                     MATHEMATICS
                                                    21
                                                                  162
                                                                                   57
         Fourth Year
    8
                              ACTUARIAL SCIENCE
                                                    22
                                                                  154
                                                                                   53
         Fourth Year
                                                                                   57
    9
                                       ECONOMICS
                                                    21
                                                                  172
          Third Year
                                                    22
    10
                                     MATHEMATICS
                                                                  172
                                                                                   78
    11
        Second Year
                                     MATHEMATICS
                                                    22
                                                                   160
                                                                                   60
                                                    23
    12
        Fourth Year
                                     MATHEMATICS
                                                                   170
                                                                                   66
    13
          First Year
                       ECONOMICS AND STATISTICS
                                                    20
                                                                   167
                                                                                   79
    14
        Second Year
                       ECONOMICS AND STATISTICS
                                                    34
                                                                  176
                                                                                   80
          Third Year
    15
                                      STATISTICS
                                                    20
                                                                  150
                                                                                   54
    16
          Third Year
                       ECONOMICS AND STATISTICS
                                                    21
                                                                  167
                                                                                   45
    17
          Third Year
                            APPLIED MATHEMATICS
                                                    20
                                                                   122
                                                                                   52
          Third Year
    18
                                      STATISTICS
                                                    21
                                                                   160
                                                                                   52
    19
        Second Year
                                      STATISTICS
                                                    21
                                                                  200
                                                                                   65
         KCSE
               Yr_JoinCampus
                                    SitKCSE
                                             Expense_Semester
                                                                 Expense_Accommodation
    0
         2016
                         2018
                                    Central
                                                           8744
                                                                                    6043
    1
         2010
                         2010
                               Rift Valley
                                                          26293
                                                                                   14782
    2
         2015
                         2016
                                    Western
                                                          44105
                                                                                   19224
    3
         2016
                         2018
                                      Coast
                                                          33954
                                                                                   18795
    4
         2013
                         2018
                                    Western
                                                          18113
                                                                                   25569
    5
         2016
                         2017
                                    Central
                                                          11648
                                                                                   41028
    6
         2016
                         2017
                               Rift Valley
                                                          39252
                                                                                   44024
```

Nyanza

8	2015	2016	Nyanza	40833	27034
9	2015	2016	Rift Valley	42264	26059
10	2016	2017	Coast	6811	39242
11	2015	2016	Coast	34148	37578
12	2015	2016	Nairobi	49155	21501
13	2010	2010	Nairobi	23654	17407
14	2012	2012	Eastern	32733	39019
15	2016	2017	Central	45232	35910
16	2016	2017	Nairobi	28393	9384
17	2016	2017	Central	24691	28958
18	2016	2017	Central	36282	48476
19	2018	2019	Nairobi	9726	20195

### ${\tt Previous\_Exam\_MeanGrade}$

0	В
1	В
2	В
3	В
4	A
5	A
6	A
7	В
8	В
9	В
10	C
11	В
12	В
13	C
14	E
15	В
16	В
17	В
18	В
19	В

## []: print(data.isnull())

	YearofStudy	Course	Age	ApproxHeight	ApproxWeight	KCSE	\
0	False	False	False	False	False	False	
1	False	False	False	False	False	False	
2	False	False	False	False	False	False	
3	False	False	False	False	False	False	
4	False	False	False	False	False	False	
	•••			•••			
57	False	False	False	False	False	False	
58	False	False	False	False	False	False	
59	False	False	False	False	False	False	
60	False	False	False	False	False	False	

61	False	False Fa	alse False	False	False	
	Yr_JoinCampus	SitKCSE	Expense_Semester	Expense_Accomm	nodation	\
0	False	False	False		False	
1	False	False	False		False	
2	False	False	False		False	
3	False	False	False		False	
4	False	False	False		False	
	•••	•••	•••	•••		
57	False	False	False		False	
58	False	False	False		False	
59	False	False	False		False	
60	False	False	False		False	
61	False	False	False		False	
	Previous_Exam	_MeanGrade	9			
0		False				
1		False	e			
2		False	9			
3		False	9			
4		False	9			
		•••				
57		False	9			
58		False	9			
59		False	9			
60		False	9			
61		False	9			

### [62 rows x 11 columns]

# []: print(data.describe())

	Age	ApproxHeight	ApproxWeight	KCSE	Yr_JoinCampus	\
count	62.00000	62.000000	62.000000	62.000000	62.000000	
mean	22.16129	158.064516	62.161290	2015.290323	2016.419355	
std	2.47077	13.583827	9.970766	1.796053	2.076791	
min	18.00000	122.000000	45.000000	2010.000000	2010.000000	
25%	21.00000	149.250000	54.000000	2015.000000	2016.000000	
50%	22.00000	157.000000	59.500000	2016.000000	2017.000000	
75%	23.00000	167.000000	68.750000	2016.000000	2017.000000	
max	34.00000	200.000000	80.000000	2018.000000	2019.000000	
	Expense_S	emester Expen	se_Accommodati	.on		
count	62	.000000	62.0000	000		
mean	28208	.209677	25530.5645	516		
std	13259	.171599	12728.0016	570		
min	6171	.000000	3536.0000	000		
25%	18199	.250000	14706.2500	000		

50%	28424.000000	25814.000000
75%	37753.500000	35681.250000
max	49155.000000	48633.000000

### []: print(data.info())

<class 'pandas.core.frame.DataFrame'>

RangeIndex: 62 entries, 0 to 61
Data columns (total 11 columns):

#	Column	Non-Null Count	Dtype
0	YearofStudy	62 non-null	object
1	Course	62 non-null	object
2	Age	62 non-null	int64
3	ApproxHeight	62 non-null	int64
4	ApproxWeight	62 non-null	int64
5	KCSE	62 non-null	int64
6	Yr_JoinCampus	62 non-null	int64
7	SitKCSE	62 non-null	object
8	Expense_Semester	62 non-null	int64
9	Expense_Accommodation	62 non-null	int64
10	Previous_Exam_MeanGrade	62 non-null	object

dtypes: int64(7), object(4)

memory usage: 5.5+ KB

None

#### []: print(data.shape)

(62, 11)

#### []: print(data.dropna())

YearofStudy	Cour	se Age	${ t Approx Height}$	ApproxWeight \	
Second Year	MATHEMATI	CS 20	152	80	
First Year	ECONOMICS AND STATISTI	CS 29	182	79	
Fourth Year	MATHEMATI	CS 22	167	64	
Second Year	ECONOMICS AND STATISTI	CS 23	149	52	
Second Year	MATHEMATI	CS 18	150	70	
•••	•••		•••	•••	
Fourth Year	MATHEMATI	CS 25	142	66	
Fourth Year	MATHEMATI	CS 23	171	55	
Third Year	ECONOMICS AND STATISTI	CS 22	174	77	
Third Year	STATISTI	CS 21	142	64	
Third Year	STATISTI	CS 22	141	58	
KCSE Yr_Joi	nCampus SitKCSE E	Expense_S	emester Expen	se_Accommodation	\
2016	2018 Central		8744	6043	
2010	2010 Rift Valley		26293	14782	
2015	2016 Western		44105	19224	
	Second Year First Year Fourth Year Second Year Second Year Fourth Year Fourth Year Third Year Third Year Third Year Third Year Third Year Third Year 2016 2010	Second Year  First Year Fourth Year Second Year Second Year Second Year  Fourth Year Fourth Year  Fourth Year Third Year	Second Year ECONOMICS AND STATISTICS 29 Fourth Year MATHEMATICS 22 Second Year ECONOMICS AND STATISTICS 23 Second Year MATHEMATICS 18 Fourth Year MATHEMATICS 25 Fourth Year MATHEMATICS 25 Third Year ECONOMICS AND STATISTICS 22 Third Year STATISTICS 21 Third Year STATISTICS 21 Third Year STATISTICS 21 Third Year STATISTICS 22 KCSE Yr_JoinCampus SitKCSE Expense_S 2016 2018 Central 2010 Rift Valley	Second Year         MATHEMATICS         20         152           First Year         ECONOMICS AND STATISTICS         29         182           Fourth Year         MATHEMATICS         22         167           Second Year         ECONOMICS AND STATISTICS         23         149           Second Year         MATHEMATICS         18         150                 Fourth Year         MATHEMATICS         25         142           Fourth Year         MATHEMATICS         23         171           Third Year         ECONOMICS AND STATISTICS         22         174           Third Year         STATISTICS         21         142           Third Year         STATISTICS         22         141           KCSE Yr_JoinCampus         SitKCSE Expense_Semester         Expense           2016         2018         Central         8744           2010         2010         Rift Valley         26293	Second Year         MATHEMATICS         20         152         80           First Year         ECONOMICS AND STATISTICS         29         182         79           Fourth Year         MATHEMATICS         22         167         64           Second Year         ECONOMICS AND STATISTICS         23         149         52           Second Year         MATHEMATICS         18         150         70                   Fourth Year         MATHEMATICS         25         142         66           Fourth Year         MATHEMATICS         23         171         55           Third Year         ECONOMICS AND STATISTICS         22         174         77           Third Year         STATISTICS         21         142         64           Third Year         STATISTICS         22         141         58           KCSE Yr_JoinCampus         SitKCSE Expense_Semester         Expense_Accommodation           2016         2018         Central         8744         6043           2010         Rift Valley         26293         14782

	3	2016 2018	Coast		33954	1	18795
	4	2013 2018			18113		25569
		•••	•••	•••		•••	
	57	2015 2016	Eastern		21556	1	L5814
	58	2015 2016	Rift Valley		36226		3536
	59	2016 2017	Coast		48495	3	31425
	60	2016 2017	v		36492		34995
	61	2016 2017	Eastern		9222	3	31360
	1	Previous_Exam_MeanGr	ado				
	0	Tevious_Exam_Healigi	B B				
	1		В				
	2		В				
	3		В				
	4		A				
			•••				
	57		C				
	58		C				
	59		В				
	60		В				
	61		В				
	[62	rows x 11 columns]					
:	pri	int(data.fillna(12)) int(data.fillna(meth int(data.fillna(meth					
	0	YearofStudy	Course	Age		0	nt \

[]:	<pre>print(data.fillna(12))</pre>
	<pre>print(data.fillna(method="ffill"))</pre>
	<pre>print(data.fillna(method="bfill"))</pre>

	YearofS	Study		Со	urse	Age	ApproxHe	eight	ApproxWeight	\	
0	Second	Year		MATHEMA	TICS	20		152	80		
1	First	Year	ECONOMI	CS AND STATIS	TICS	29		182	79		
2	Fourth	Year		MATHEMA	TICS	22		167	64		
3	Second	Year	ECONOMI	CS AND STATIS	TICS	23		149	52		
4	Second	Year		MATHEMA	TICS	18		150	70		
		•••		•••			•••		•••		
57	Fourth	Year		MATHEMA	TICS	25		142	66		
58	Fourth	Year		MATHEMA	TICS	23		171	55		
59	Third	Year	ECONOMI	CS AND STATIS	TICS	22		174	77		
60	Third	Year		STATIS	TICS	21		142	64		
61	Third	Year		STATIS	TICS	22		141	58		
	KCSE Y	r_Joi	nCampus	SitKCSE	Expe	nse_S	emester	Expen	se_Accommodation	on '	\
0	2016		2018	Central			8744		604	43	
1	2010		2010	Rift Valley			26293		1478	32	
2	2015		2016	Western			44105		1922	24	
3	2016		2018	Coast			33954		1879	95	
4	2013		2018	Western			18113		2556	39	
	•••		•••	•••		•••			•••		

57	2015	2016 E	astern		21556		158	314
58	2015				36226			536
59	2016	2017	Coast		48495		314	
60	2016		Nyanza		36492		349	
61	2016		astern		9222		313	
-					V		010	,
	Previous_Exam	_MeanGrade						
0	_	В						
1		В						
2		В						
3		В						
4		Α						
		•••						
57		С						
58		С						
59		В						
60		В						
61		В						
[62	rows x 11 co	lumns]						
	YearofStudy		Course	Age	ApproxH	eight	ApproxWeight	\
0	Second Year		MATHEMATICS	20		152	80	
1	First Year	ECONOMICS AND	STATISTICS	29		182	79	
2	Fourth Year		MATHEMATICS	22		167	64	
3	Second Year	ECONOMICS AND	STATISTICS	23		149	52	
4	Second Year		MATHEMATICS	18		150	70	
					•••		•••	
57	Fourth Year		MATHEMATICS	25		142	66	
58	Fourth Year		MATHEMATICS	23		171	55	
59	Third Year	ECONOMICS AND	STATISTICS	22		174	77	
60	Third Year		STATISTICS	21		142	64	
61	Third Year		STATISTICS	22		141	58	
	KCSE Yr_Joi	nCampus S	itKCSE Expe	nse_S	emester	Expen	.se_Accommodati	ion \
0	2016	2018 C	entral		8744		60	)43
1	2010	2010 Rift	Valley		26293		147	′82
2	2015	2016 W	estern		44105		192	224
3	2016	2018	Coast		33954		187	<b>'</b> 95
4	2013	2018 W	estern		18113		255	69
	•••	•••		•••			•••	
57	2015	2016 E	astern		21556		158	314
58	2015	2016 Rift	Valley		36226		35	536
59	2016	2017	Coast		48495		314	ł25
60	2016	2017	Nyanza		36492		349	95
61	2016		astern		9222		313	360

6

 ${\tt Previous\_Exam\_MeanGrade}$ 

В

1			В				
2			В				
3			В				
4			A				
•		•••	A				
57			С				
58	C						
59			В				
60	В						
61	В						
[62	rows x 11 co	lumns]					
	YearofStudy		Cours	_	ApproxHeigh	t ApproxWeight \	
0	Second Year		MATHEMATIC	CS 20	15	52 80	
1	First Year	ECONOMI	CS AND STATISTIC	CS 29	18	32 79	
2	Fourth Year		MATHEMATIC	CS 22	16	64	
3	Second Year	ECONOMI	CS AND STATISTIC	CS 23	14	9 52	
4	Second Year		MATHEMATIC	CS 18	15	50 70	
	•••			•	•••	•••	
57	Fourth Year		MATHEMATIO		14	.2 66	
58	Fourth Year		MATHEMATIC	CS 23	17	'1 55	
59	Third Year	ECONOMI	CS AND STATISTIC	CS 22	17	74 77	
60	Third Year		STATISTIC	CS 21	14	2 64	
61	Third Year		STATISTIC	CS 22	14	1 58	
	W000 W T .	<b>a</b>	avaan n	_			
_		nCampus		rpense_S	-	ense_Accommodation \	,
0	2016	2018	Central		8744	6043	
1	2010	2010	Rift Valley		26293	14782	
2	2015	2016	Western		44105	19224	
3	2016	2018	Coast		33954	18795	
4	2013	2018	Western		18113	25569	
			 	•••	04556		
57	2015	2016			21556	15814	
58	2015	2016	Rift Valley		36226	3536	
59	2016	2017	Coast		48495	31425	
60	2016	2017	Nyanza		36492	34995	
61	2016	2017	Eastern		9222	31360	
	Previous_Exam	MoonCro	do				
0	Flevious_Exam	_meangra	B B				
			В				
1							
2			В				
3			В				
4			٨				
			A				
 57		•••					
57		•••	C				

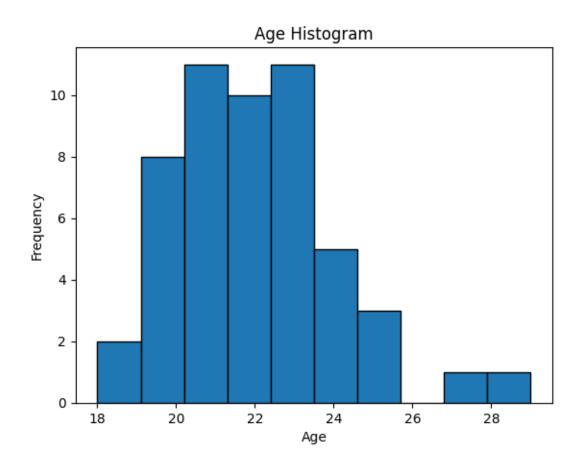
```
B
61 B
[62 rows x 11 columns]

C:\Users\Pratham m\AppData\Local\Temp\ipykernel_7680\3243905285.py:2:
FutureWarning: DataFrame.fillna with 'method' is deprecated and will raise in a future version. Use obj.ffill() or obj.bfill() instead.
    print(data.fillna(method="ffill"))

C:\Users\Pratham m\AppData\Local\Temp\ipykernel_7680\3243905285.py:3:
FutureWarning: DataFrame.fillna with 'method' is deprecated and will raise in a future version. Use obj.ffill() or obj.bfill() instead.
    print(data.fillna(method="bfill"))
```

```
[]: import matplotlib.pyplot as plt
     # Assuming your data is in a list called 'data'
     data = [
         20,
         29,
         22,
         23,
         18,
         20,
         21,
         21,
         22,
         21,
         22,
         22,
         23,
         20,
         21,
         21,
         20,
         21,
         27,
         20,
         20,
         21,
         18,
         23,
         24,
         22,
         21,
         20.
         25,
         24,
```

```
21,
    24,
    24,
    22,
    23,
    22,
    23,
    22,
    23,
    20,
    21,
    23,
    25,
    23,
    25,
    21,
    22,
    23,
    22,
    24,
    23,
    23,
]
plt.hist(data, bins=10, edgecolor="k")
plt.xlabel("Age")
plt.ylabel("Frequency")
plt.title("Age Histogram")
plt.show()
```

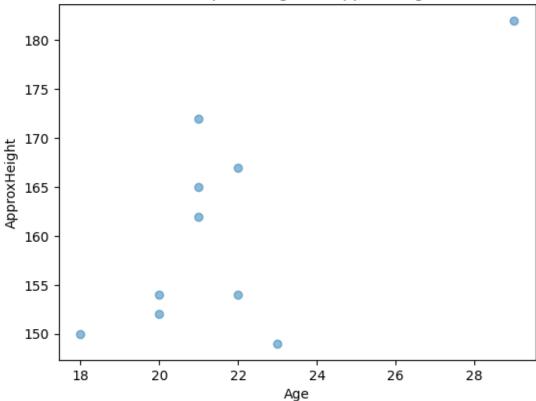


```
[]: import matplotlib.pyplot as plt

# Example data with matching sizes
Age = [20, 29, 22, 23, 18, 20, 21, 21, 22, 21]
ApproxHeight = [152, 182, 167, 149, 150, 154, 165, 162, 154, 172]

plt.scatter(Age, ApproxHeight, alpha=0.5)
plt.xlabel("Age")
plt.ylabel("ApproxHeight")
plt.title("Scatterplot of Age vs. ApproxHeight")
plt.show()
```

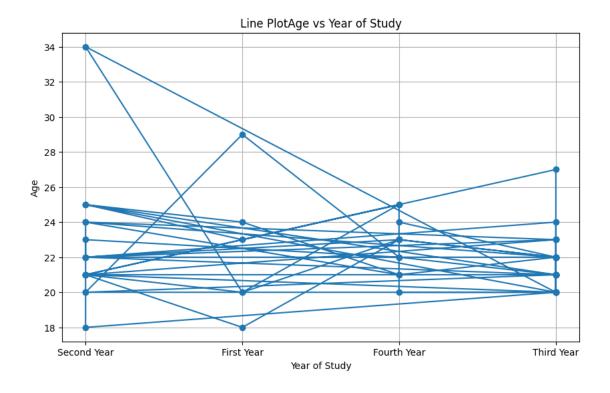
# Scatterplot of Age vs. ApproxHeight



```
[]: import pandas as pd
  import matplotlib.pyplot as plt

# Assuming you have your data in a CSV file named 'student_data.csv'
  df = pd.read_csv("D:\PRATHAM FILES\Web design Project\Python_\text{\text{\text{offigure}(figsize=(10, 6))}}
  plt.figure(figsize=(10, 6))
  plt.plot(df["YearofStudy"], df["Age"], marker="o")
  plt.xlabel("Year of Study")
  plt.ylabel("Age")

plt.title("Line Plot" "" "Age vs Year of Study")
  plt.grid(True)
  plt.show()
```



```
plt.figure(figsize=(10, 6))
sns.countplot(data=df, x="YearofStudy")
plt.xlabel("Year of Study")
plt.ylabel("Count")
plt.title("Bar Graph Count of Students in Each Year of Study")
plt.xticks(rotation=45)
plt.show()
C:\Users\Pratham m\AppData\Local\Packages\PythonSoftwareFoundation.Python.3.11_q
bz5n2kfra8p0\LocalCache\local-packages\Python311\site-
packages\seaborn\_oldcore.py:1498: FutureWarning: is_categorical_dtype is
deprecated and will be removed in a future version. Use isinstance(dtype,
CategoricalDtype) instead
  if pd.api.types.is_categorical_dtype(vector):
C:\Users\Pratham m\AppData\Local\Packages\PythonSoftwareFoundation.Python.3.11_q
bz5n2kfra8p0\LocalCache\local-packages\Python311\site-
packages\seaborn\_oldcore.py:1498: FutureWarning: is_categorical_dtype is
deprecated and will be removed in a future version. Use isinstance(dtype,
```

[]: import seaborn as sns

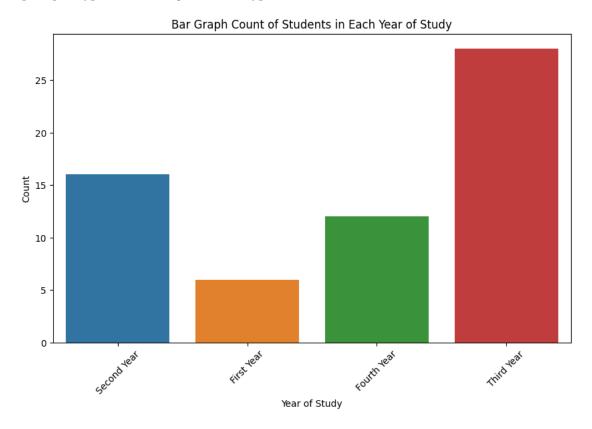
import matplotlib.pyplot as plt

CategoricalDtype) instead

if pd.api.types.is\_categorical\_dtype(vector):

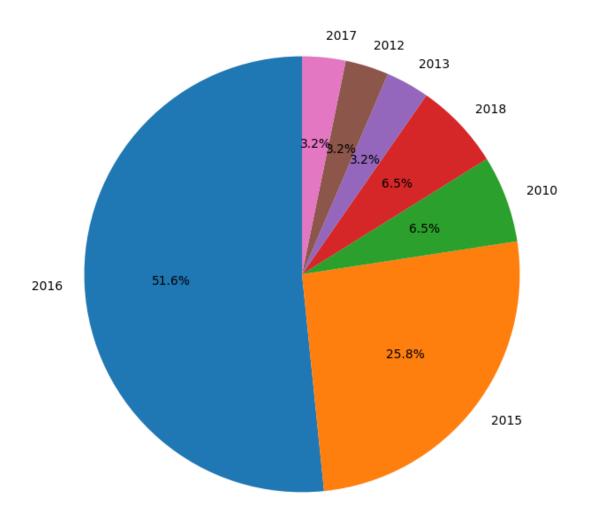
bz5n2kfra8p0\LocalCache\local-packages\Python311\site-packages\seaborn\\_oldcore.py:1498: FutureWarning: is\_categorical\_dtype is deprecated and will be removed in a future version. Use isinstance(dtype, CategoricalDtype) instead

if pd.api.types.is\_categorical\_dtype(vector):



```
[]: plt.figure(figsize=(8, 8))
   df["KCSE"].value_counts().plot.pie(autopct="%1.1f%%", startangle=90)
   plt.title(" Pie Chart Distribution of Students by KCSE Grade")
   plt.ylabel("")
   plt.show()
```

### Pie Chart Distribution of Students by KCSE Grade

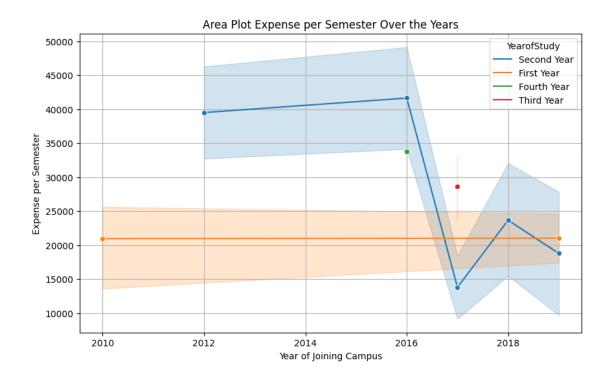


```
import seaborn as sns
import matplotlib.pyplot as plt

plt.figure(figsize=(10, 6))
sns.lineplot(
    data=df, x="Yr_JoinCampus", y="Expense_Semester", hue="YearofStudy", umarker="o"
)
plt.xlabel("Year of Joining Campus")
plt.ylabel("Expense per Semester")
plt.title("Area Plot Expense per Semester Over the Years")
```

```
plt.show()
C:\Users\Pratham m\AppData\Local\Packages\PythonSoftwareFoundation.Python.3.11_q
bz5n2kfra8p0\LocalCache\local-packages\Python311\site-
packages\seaborn\_oldcore.py:1498: FutureWarning: is_categorical_dtype is
deprecated and will be removed in a future version. Use isinstance(dtype,
CategoricalDtype) instead
  if pd.api.types.is_categorical_dtype(vector):
C:\Users\Pratham m\AppData\Local\Packages\PythonSoftwareFoundation.Python.3.11 q
bz5n2kfra8p0\LocalCache\local-packages\Python311\site-
packages\seaborn\_oldcore.py:1498: FutureWarning: is_categorical_dtype is
deprecated and will be removed in a future version. Use isinstance(dtype,
CategoricalDtype) instead
  if pd.api.types.is_categorical_dtype(vector):
C:\Users\Pratham m\AppData\Local\Packages\PythonSoftwareFoundation.Python.3.11 q
bz5n2kfra8p0\LocalCache\local-packages\Python311\site-
packages\seaborn\_oldcore.py:1498: FutureWarning: is_categorical_dtype is
deprecated and will be removed in a future version. Use isinstance(dtype,
CategoricalDtype) instead
  if pd.api.types.is_categorical_dtype(vector):
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```

plt.grid(True)



```
[]: import seaborn as sns
import matplotlib.pyplot as plt

plt.figure(figsize=(10, 6))
sns.boxplot(data=df, x="YearofStudy", y="Expense_Semester")
plt.xlabel("Year of Study")
plt.ylabel("Expense per Semester")
plt.title(" Box Plot Expense Distribution by Year of Study")
plt.grid(True)
plt.show()
```

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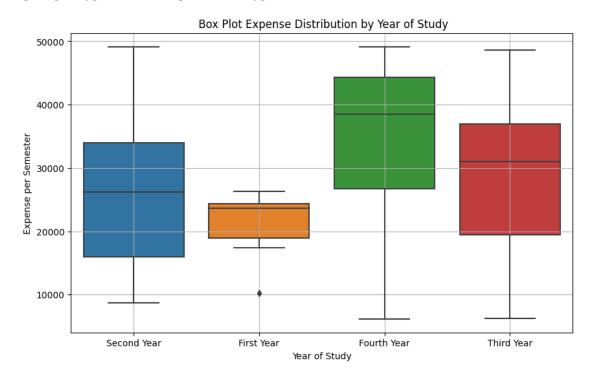
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```
[]: import seaborn as sns

sns.pairplot(df[["Age", "ApproxHeight", "ApproxWeight", "KCSE",

□ "Expense_Semester"]])

plt.suptitle(" Pair plot Pair Plot of Numerical Variables", y=1.02)

plt.show()
```

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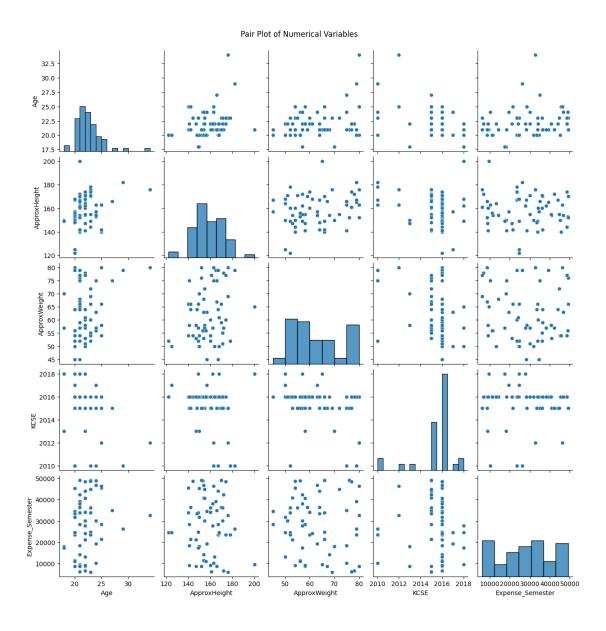
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packages\seaborn\axisgrid.py:118: UserWarning: The figure layout has changed to
tight
  self._figure.tight_layout(*args, **kwargs)
```

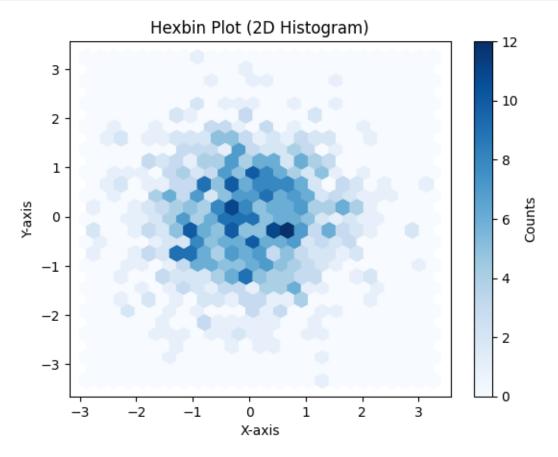


```
[]: import numpy as np
import matplotlib.pyplot as plt

# Generate random data
x = np.random.randn(1000)
y = np.random.randn(1000)

# Create a hexbin plot
plt.hexbin(x, y, gridsize=25, cmap="Blues")
plt.colorbar(label="Counts")
plt.xlabel("X-axis")
plt.ylabel("Y-axis")
```

```
plt.title("Hexbin Plot (2D Histogram)")
plt.show()
```



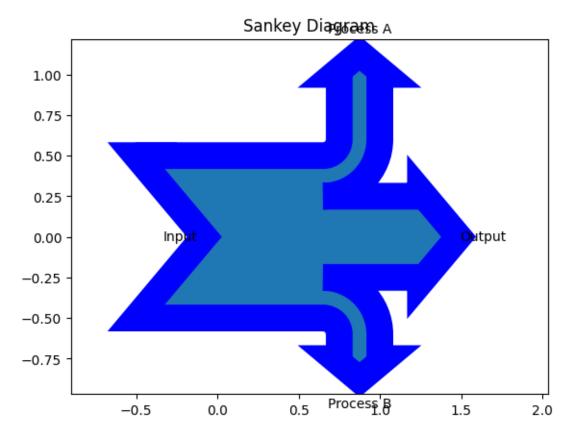
```
[]: import matplotlib.pyplot as plt
from matplotlib.sankey import Sankey

fig, ax = plt.subplots()
ax.set_xlim(-0.5, 3)
ax.set_ylim(-0.5, 0.5)

sankey = Sankey(ax=ax, unit=None)
sankey.add(
    flows=[1, -0.25, -0.25, -0.5],
    labels=["Input", "Process A", "Process B", "Output"],
    orientations=[0, 1, -1, 0],
    pathlengths=[0, 0.5, 0.25, 0.25],
    trunklength=1.5,
    linewidth=20,
    color="blue",
```

```
)
sankey.finish()

plt.title("Sankey Diagram")
plt.show()
```



[]: