DATA DESCRIPTION

The dataset contains 718 rows and 8 columns, though some columns have missing values.

It appears to be a record of midterm marks for students across different subjects.

Columns:

S.NO (float64) - Serial number of students (601 non-null values, some missing).

SECTION (object) - Section name (e.g., ALPHA) of the student (691 non-null values).

DV (object) - Marks in a subject named "DV" (716 non-null values).

M-II (object) - Marks in "M-II" subject (716 non-null values).

PP (object) - Marks in "PP" subject (716 non-null values).

BEEE (object) - Marks in "BEEE" subject (716 non-null values).

FL (object) - Marks in "FL" subject (715 non-null values).

FIMS (object) - Marks in "FIMS" subject (716 non-null values).

	S.NO	SECTION	DV	M-II	PP	BEEE	FL	FIMS
0	1	ALPHA	12	0	17	9	19	15
1	2	ALPHA	19	12	16	16	18	3
2	3	ALPHA	18	14	18	18	18	16
3	4	ALPHA	15	9	19	17	19	15
4	5	ALPHA	18	17	19	19	20	18
475	476	NaN	18	2	12	3	17	15
476	477	NaN	20	6	16	11	20	14
477	478	NaN	20	NaN	18	13	20	18
478	479	NaN	20	20	5	19	18	14
479	480	NaN	20	16	18	19	20	19

480 rows × 8 columns

In [307... df['SECTION'] = df['SECTION'].fillna('ZETA')

Out[307...

Out[303...

	S.NO	SECTION	DV	M-II	PP	BEEE	FL	FIMS
0	1	ALPHA	12	0	17	9	19	15
1	2	ALPHA	19	12	16	16	18	3
2	3	ALPHA	18	14	18	18	18	16
3	4	ALPHA	15	9	19	17	19	15
4	5	ALPHA	18	17	19	19	20	18
475	476	ZETA	18	2	12	3	17	15
476	477	ZETA	20	6	16	11	20	14
477	478	ZETA	20	NaN	18	13	20	18
478	479	ZETA	20	20	5	19	18	14
479	480	ZETA	20	16	18	19	20	19

480 rows × 8 columns

In [311... df['DV'] = df['DV'].replace(['MP'],0)

Out[311...

	S.NO	SECTION	DV	M-II	PP	BEEE	FL	FIMS
0	1	ALPHA	12	0	17	9	19	15
1	2	ALPHA	19	12	16	16	18	3
2	3	ALPHA	18	14	18	18	18	16
3	4	ALPHA	15	9	19	17	19	15
4	5	ALPHA	18	17	19	19	20	18
475	476	ZETA	18	2	12	3	17	15
476	477	ZETA	20	6	16	11	20	14
477	478	ZETA	20	NaN	18	13	20	18
478	479	ZETA	20	20	5	19	18	14
479	480	ZETA	20	16	18	19	20	19

480 rows × 8 columns

In [283... df.replace(["AB","mp"],0, inplace=True)

In [293... df

```
2
                      ALPHA
                              18
                                   14
                                       18
                                             18
                                                 18
                                                       16
           3
                 4
                      ALPHA
                              15
                                    9
                                       19
                                             17 19
                                                       15
                                             19 20
           4
                 5
                      ALPHA
                             18
                                   17
                                                       18
                                       19
          475
                476
                        NaN
                              18
                                    2
                                       12
                                              3 17
                                                       15
                                       16
          476
               477
                        NaN
                              20
                                    6
                                             11 20
                                                       14
                              20 NaN
                                             13 20
         477
               478
                        NaN
                                       18
                                                       18
          478
               479
                        NaN
                              20
                                   20
                                             19
                                                 18
                                                       14
         479
               480
                        NaN
                              20
                                   16
                                      18
                                             19 20
                                                       19
         480 rows × 8 columns
 In []: df['S.NO'] = range(1, len(df) + 1)
         df['SECTION'] = df['SECTION'].fillna('SIGMA')
         df['SECTION'] = df['SECTION'].replace('', 'SIGMA')
 In []: df['S.NO'] = range(1, len(df) + 1)
In [82]: df.shape
Out[82]: (480, 17)
In [84]: df.info()
        <class 'pandas.core.frame.DataFrame'>
        RangeIndex: 480 entries, 0 to 479
        Data columns (total 17 columns):
         # Column
                            Non-Null Count Dtype
         0
                             480 non-null
             S.NO
                                             int64
             SECTION
                             480 non-null
                                             object
         2
             DV
                             480 non-null
                                             int32
         3
                             480 non-null
                                             int32
             PP
         4
                             480 non-null
                                             int32
         5
             BEEE
                             480 non-null
                                             int32
         6
             FL
                             480 non-null
                                             int32
         7
             FIMS
                             480 non-null
                                             int32
         8
                             480 non-null
             Total
                                             int32
         9
             Percentage
                             480 non-null
                                             float64
         10
                             0 non-null
                                             object
             Grade
             backlogs
                             480 non-null
                                             int64
             Coding-skills 480 non-null
         12
                                             obiect
         13
             PP Grade
                             480 non-null
                                             object
         14 DV Grade
                             480 non-null
                                             obiect
         15 skills
                             480 non-null
                                             object
         16 section
                             480 non-null
                                             object
        dtypes: float64(1), int32(7), int64(2), object(7)
        memory usage: 50.8+ KB
In [86]: df.shape
         df.size
Out[86]: 8160
In [88]: df.size
Out[88]: 8160
In [90]: df.rename(columns={'M-II': 'M2'}, inplace=True)
In [92]: df
```

Out[293...

0

S.NO SECTION DV

1

2

AI PHA

ALPHA

M-II PP BEEE FL FIMS

9 19

16 18

15

3

0

12 16

17

12

19

Out[92]:														Coding-			
001[32].		S.NO	SECTION	DV	M2	PP	BEEE	FL	FIMS	Total	Percentage	Grade	backlogs	skills	PP_Grade	DV_Grade	skills
	0	1	ALPHA	12	0	17	9	19	15	72	60.00	NaN	2	good	Good	Good	Good
	1	2	ALPHA	19	12	16	16	18	3	84	70.00	NaN	1	good	Good	Good	Good
	2	3	ALPHA	18	14	18	18	18	16	102	85.00	NaN	0	very good	Very Good	Very Good	Very Good
	3	4	ALPHA	15	9	19	17	19	15	94	78.33	NaN	1	very good	Very Good	Very Good	Very Good
	4	5	ALPHA	18	17	19	19	20	18	111	92.50	NaN	0	very good	Very Good	Very Good	Very Good
	475	476	SIGMA	18	2	12	3	17	15	67	55.83	NaN	2	poor	poor	Poor	Poor
	476	477	SIGMA	20	6	16	11	20	14	87	72.50	NaN	1	good	Good	Good	Good
	477	478	SIGMA	20	0	18	13	20	18	89	74.17	NaN	1	very good	Very Good	Very Good	Very Good
	478	479	SIGMA	20	20	5	19	18	14	96	80.00	NaN	1	poor	poor	Poor	Poor
	479	480	SIGMA	20	16	18	19	20	19	112	93.33	NaN	0	very good	Very Good	Very Good	Very Good
	480 r	ows × 1	7 columns														
	4																
	4																
In [269																	
In [269 Out[269	df	S.NO	SECTION	DV	M2	PP	BEEE	FL	FIMS	Total	Percentage	Grade	backlogs	Coding- skills	PP_Grade	DV_Grade	,
	df	S.NO	SECTION ALPHA	DV	M2	PP 17	BEEE 9	FL 19	FIMS 15	Total	Percentage	Grade NaN	backlogs 2	Coding- skills	PP_Grade Good	DV_Grade Good	,
	df													skills			skills
	df 0	1	ALPHA	12	0	17	9	19	15	72	60.00	NaN	2	good	Good	Good	skills Good
	0 1	1 2	ALPHA ALPHA	12 19	0 12	17 16	9	19 18	15 3	72 84	60.00	NaN NaN	2	good good very	Good Good Very	Good Good	skills Good Good Very
	0 1 2	1 2 3	ALPHA ALPHA	12 19 18	0 12 14	17 16 18	9 16 18	19 18 18	15 3 16	72 84 102	60.00 70.00 85.00	NaN NaN NaN	2 1 0	good good very good very	Good Good Very Good	Good Good Very Good	skills Good Good Very Good Very
	0 1 2	1 2 3	ALPHA ALPHA ALPHA ALPHA	12 19 18 15	0 12 14	17 16 18 19	9 16 18 17	19 18 18 19	15 3 16 15	72 84 102 94	60.00 70.00 85.00 78.33	NaN NaN NaN	2 1 0	good good very good very good very yery	Good Very Good Very Good Very	Good Good Very Good	skills Good Good Very Good Very Good Very Very
	0 1 2 3	1 2 3 4 5	ALPHA ALPHA ALPHA ALPHA	12 19 18 15	0 12 14 9	17 16 18 19	9 16 18 17 19	19 18 18 19 20	15 3 16 15	72 84 102 94 111	60.00 70.00 85.00 78.33 92.50	NaN NaN NaN NaN	2 1 0 1 0	skills good good very good very good very good	Good Good Very Good Very Good Very Good	Good Good Very Good Very Good	skills Good Good Very Good Very Good Very Good
	0 1 2 3 4	1 2 3 4 5	ALPHA ALPHA ALPHA ALPHA	12 19 18 15 18 	0 12 14 9 17 	17 16 18 19 19	9 16 18 17 19 	19 18 18 19 20	15 3 16 15 18	72 84 102 94 111	60.00 70.00 85.00 78.33 92.50	NaN NaN NaN NaN NaN	2 1 0 1 0	good good very good very good very good very good	Good Good Very Good Very Good Very Good	Good Good Very Good Very Good Very Good	skills Good Good Very Good Very Good Very Good
	0 1 2 3 4 	1 2 3 4 5 476	ALPHA ALPHA ALPHA ALPHA ALPHA SIGMA	12 19 18 15 18 18 20	0 12 14 9 17 	17 16 18 19 19 12	9 16 18 17 19 3	19 18 18 19 20 	15 3 16 15 18 	72 84 102 94 111 67	60.00 70.00 85.00 78.33 92.50 	NaN NaN NaN NaN NaN NaN	2 1 0 1 0 	skills good good very good very good very good poor	Good Good Very Good Very Good Very Good Poor	Good Good Very Good Very Good Very Good 	skills Good Good Very Good Very Good Very Good Poor
	0 1 2 3 4 475 476	1 2 3 4 5 476 477	ALPHA ALPHA ALPHA ALPHA ALPHA SIGMA SIGMA	12 19 18 15 18 18 20	0 12 14 9 17 2	17 16 18 19 19 12	9 16 18 17 19 3 11	19 18 18 19 20 17 20	15 3 16 15 18 15	72 84 102 94 111 67 87	60.00 70.00 85.00 78.33 92.50 55.83 72.50	NaN NaN NaN NaN NaN NaN NaN	2 1 0 1 2	skills good good very	Good Good Very Good Very Good Very Good Very Good Very Good Very Very Cood	Good Good Very Good Very Good Very Good Poor Good	skills Good Good Very Good Very Good Very Good Very Good Very Good Very Cood Very Cood

480 rows × 17 columns

```
In [95]: df['S.NO'] = range(1, len(df) + 1)
    df['SECTION'] = df['SECTION'].fillna('SIGMA')
    df['SECTION'] = df['SECTION'].replace('', 'SIGMA')
    print("Updated DataFrame with missing sections replaced by 'SIGMA':")
    df
```

 $\label{local_potential} \mbox{Updated DataFrame with missing sections replaced by 'SIGMA':}$

		S.NO	SECTION	DV	M2	PP	BEEE	FL	FIMS	Total	Percentage	Grade	backlogs	Coding- skills	PP_Grade	DV_Grade	skills
	0	1	ALPHA	12	0	17	9	19	15	72	60.00	NaN	2	good	Good	Good	Good
	1	2	ALPHA	19	12	16	16	18	3	84	70.00	NaN	1	good	Good	Good	Goo
	2	3	ALPHA	18	14	18	18	18	16	102	85.00	NaN	0	very good	Very Good	Very Good	Vei God
	3	4	ALPHA	15	9	19	17	19	15	94	78.33	NaN	1	very good	Very Good	Very Good	Vei God
	4	5	ALPHA	18	17	19	19	20	18	111	92.50	NaN	0	very good	Very Good	Very Good	Ve God
	475	476	SIGMA	18	2	12	3	17	15	67	55.83	NaN	2	poor	poor	Poor	Ро
4	476	477	SIGMA	20	6	16	11	20	14	87	72.50	NaN	1	good	Good	Good	God
•	477	478	SIGMA	20	0	18	13	20	18	89	74.17	NaN	1	very good	Very Good	Very Good	Ve Go
4	478	479	SIGMA	20	20	5	19	18	14	96	80.00	NaN	1	poor	poor	Poor	Po
4	479	480	SIGMA	20	16	18	19	20	19	112	93.33	NaN	0	very good	Very Good	Very Good	Ve Go
(df[' df[' df['	PP'] = BEEE'] FL'] =	pd.to_nu	_nume	eric(ic(d1	df[' ['FL	BEEE'] .'], er	ror	rrors= s='coe	'coerd	ce').fillna fillna(0). ce').fillna	(0).ast astype	type(int) (int)				
	df[' df[' df['	PP'] = BEEE'] FL'] = FIMS']	<pre>pd.to_nu = pd.to_ pd.to_nu = pd.to_nu = pd.to_</pre>	_nume umer: _nume	eric(ic(df eric((df[' ['FL (df['	BEEE'] -'], en	, e ror: , e	rrors= s='coe rrors=	'coerd rce'). 'coerd	ce').fillna fillna(0). ce').fillna	(0).ast astype (0).ast	type(int) (int) type(int)	Coding-	PP Grade	DV Grade	ski
	df[' df[' df[' df['	PP'] = BEEE'] FL'] = FIMS'] S.NO	pd.to_nu = pd.to_ pd.to_nu = pd.to_ SECTION	_numer: _nume	eric(ic(d1 eric((df[' F['FL (df['	BEEE'] .'], er FIMS'] BEEE	, e rrors , e	rrors= s='coe rrors= FIMS	'coerd' rce'). 'coerd	ce').fillna fillna(0). ce').fillna Percentage	(0).ast astype (0).ast	type(int) (int) type(int) backlogs	skills		DV_Grade	
	df[' df[' df[' df['	PP'] = BEEE'] FL'] = FIMS']	<pre>pd.to_nu = pd.to_ pd.to_nu = pd.to_nu = pd.to_</pre>	_nume umer: _nume	eric(ic(df eric((df[' ['FL (df['	BEEE'] -'], er FIMS'] BEEE	, e ror: , e	rrors= s='coe rrors=	'coerd rce'). 'coerd	ce').fillna fillna(0). ce').fillna	(0).ast astype (0).ast	type(int) (int) type(int)		PP_Grade Good Good	DV_Grade Good Good	Go
	df[' df[' df[' df[' df	PP'] = BEEE'] FL'] = FIMS'] S.NO	pd.to_nu = pd.to_ pd.to_nu = pd.to_ SECTION ALPHA	_numeri_nume _nume _nume	m2 0 12	(df[' ['FL (df[' PP 17	BEEE'] -'], er FIMS'] BEEE	, e rrors , e FL 19 18	rrors= s='coe rrors= FIMS	'coerd' 'coerd Total	Percentage	(0).astastype(0).ast	type(int) type(int) type(int) backlogs	good	Good	Good	Go Go Ve
	df[' df[' df[' df[' df	PP'] = BEEE'] FL'] = FIMS'] S.NO 1 2	pd.to_nu = pd.to_ pd.to_nu = pd.to_ SECTION ALPHA	numenumenumenume	M2 0 12	(df[' ['FL (df[' PP 17	BEEE'], er FIMS'] BEEE 9 16	, e rrors , e FL 19	rrors= s='coe rrors= FIMS 15	'coerd' 'coerd Total 72 84	Percentage 60.00 70.00	(0).ast astype (0).ast Grade NaN NaN	type(int) type(int) backlogs 2 1	good good very	Good	Good	Go Go Ve Go
	df[' df[' df[' df[' df[' df[' df[' df]]]]]]]	PP'] = BEEE'] = BEEE'] = FIMS'] S.NO 1 2 3	section ALPHA ALPHA ALPHA	numenumenumenume	M2 0 12	df['FL' FL' FL	BEEE'], er FIMS'] BEEE 9 16 18	, e rror: , e 19 18	rrors= s='coe rrors= FIMS 15 3	'coerd' 'coerd' 'coerd' Total 72 84 102	Percentage 60.00 70.00 85.00	(0) ast astype (0) ast Grade NaN NaN	type(int) (int) type(int) backlogs 2 1	good good very good very	Good Good Very Good Very	Good Good Very Good	Go
	0 1 2 3	PP'] = BEEE'] FL'] = FIMS'] S.NO 1 2 3	section ALPHA ALPHA ALPHA ALPHA	numenumenumenume	M2 0 12 14	df['FL' FL' FL	BEEE'], er FIMS'] BEEE 9 16 18 17	, e	FIMS 15 3 16	'coerd' 'coerd' 'coerd' Total 72 84 102 94	Percentage 60.00 70.00 85.00	(0) astiastype (0) asti	backlogs 2 1 0	good good very good very good very yery	Good Very Good Very Good Very	Good Good Very Good	Go Ve Go Ve Go
	0 1 2 3 4	PP'] = BEEE'] FL'] = FIMS'] S.NO 1 2 3 4	section ALPHA ALPHA ALPHA ALPHA	numer:nume	M2 0 12 14 9	PP 17 16 18 19 19	BEEE'], er FIMS'] BEEE 9 16 18 17 19	, e	rrors= s='coe rrors= FIMS 15 3 16 15	'coerd' 'coerd' 'toerd' 'toerd	Percentage 60.00 70.00 85.00 78.33	(0) astastype (0) astastype (Nan Nan Nan Nan Nan Nan Nan Nan Nan Nan	backlogs 2 1 0 1	good good very good very good very good very good	Good Good Very Good Very Good Very Good	Good Good Very Good Very Good	Go Vé Go Vé Go
	0 1 2 3 4	PP'] = BEEE']	SECTION ALPHA	nume	M2 0 12 14 9 17	PP 17 16 18 19	BEEE'], er FIMS'] BEEE 9 16 18 17 19 	, e	FIMS 15 3 16 15 18	'coerd' 'coerd' 'coerd' Total 72 84 102 94 111	Percentage 60.00 70.00 85.00 78.33 92.50	(0) ast astype (0) ast Grade NaN NaN NaN NaN	type(int) (int) type(int) backlogs 2 1 0	good good very good very good very good very good	Good Good Very Good Very Good Very Good	Good Good Very Good Very Good Very Good	Goo Ve Goo Ve Goo Po
	0 1 2 3 4 475	PP'] = BEEE']	section ALPHA ALPHA	numer:nume	M2 0 12 14 9 17	PP 17 16 18 19 12	BEEE'], er FIMS'] BEEE 9 16 18 17 19 	, e	rrors= s='coe rrors= FIMS 15 3 16 15 18 15	'coerd' 'coerd' 'coerd' 'toerd' 'toerd	Percentage 60.00 70.00 85.00 78.33 92.50 55.83	(0) astastype (0	backlogs 2 1 0 2	skills good good very good very good very good very good poor	Good Good Very Good Very Good Very Good Very Good	Good Good Very Good Very Good Very Good Poor	Go Go Ve Go Ve Go
	0 1 2 3 4 4475	PP'] = BEEE'] FL'] = FIMS'] S.NO 1 2 3 4 5 476 477	SECTION ALPHA ALPHA ALPHA ALPHA ALPHA SIGMA SIGMA	numer:nume	M2 0 12 14 9 17 2	PP 17 16 18 19 12 16	BEEE'], er FIMS'] BEEE 9 16 18 17 19 3 11	, e	rrors= s='coe rrors= FIMS 15 3 16 15 18 15	'coerd' 'coerd' 'coerd' 'toerd' 'toerd	Percentage 60.00 70.00 85.00 78.33 92.50 55.83 72.50	(0) astastype (0	backlogs 2 1 0 2 1	skills good good very	Good Good Very Good Very Good Very Good Very Good Very Good Very Cood Very Cood	Good Good Very Good Very Good Very Good Poor Good	Go Go Ve Go Ve Go Ve Go
	0 1 2 3 4 4475 4476	PP'] = BEEE']	SECTION ALPHA ALPHA ALPHA ALPHA ALPHA SIGMA SIGMA SIGMA	numer:nume	M2 0 12 14 9 17 2 6 0 20	PP 17 16 18 19 12 16 18	BEEE'], er FIMS'] BEEE 9 16 18 17 19 3 11	, e	rrors= s='coe rrors= FIMS 15 3 16 15 18 15 14	'coerd' 'coerd' 'coerd' 'toerd' 'toerd	Percentage 60.00 70.00 85.00 78.33 92.50 55.83 72.50 74.17	(0) astiastype (0) as	backlogs 2 1 0 2 1	skills good good very good	Good Good Very Good Very Good Very Good Very Good Very Good Very Good	Good Good Very Good Very Good Very Good Poor Good Very Good	Good Ve Good V
	0 1 2 3 4 475 4476 4479	PP'] = BEEE']	SECTION ALPHA ALPHA ALPHA ALPHA ALPHA SIGMA SIGMA SIGMA SIGMA	numer:nume	M2 0 12 14 9 17 2 6 0 20	PP 17 16 18 19 12 16 18 5	BEEE'], er FIMS'] BEEE 9 16 18 17 19 3 11 13	, e , e	rrors= s='coe rrors= FIMS 15 3 16 15 18 15 14 18 14	'coerd' 'coerd' 'coerd' 'toerd' 'toerd	Percentage 60.00 70.00 85.00 78.33 92.50 55.83 72.50 74.17 80.00	(0) astiastype (0) as	backlogs 2 1 0 2 1 1 1	skills good good very good very good very good very good very good poor very	Good Good Very Good Very Good Very Good Very Good Very Good Very Cood Very Cood Very Cood Very Cood Very Cood	Good Good Very Good Very Good Very Good Poor Poor	Goo Ve Ve Goo Ve

In [101... df

Ö.		tί	4	Ö.	4	
	u.		ш		л	

	S.NO	SECTION	DV	M2	PP	BEEE	FL	FIMS	Total	Percentage	Grade	backlogs	Coding- skills	PP_Grade	DV_Grade	skills
0	1	ALPHA	12	0	17	9	19	15	72	60.00	NaN	2	good	Good	Good	Good
1	2	ALPHA	19	12	16	16	18	3	84	70.00	NaN	1	good	Good	Good	Good
2	3	ALPHA	18	14	18	18	18	16	102	85.00	NaN	0	very good	Very Good	Very Good	Very Good
3	4	ALPHA	15	9	19	17	19	15	94	78.33	NaN	1	very good	Very Good	Very Good	Very Good
4	5	ALPHA	18	17	19	19	20	18	111	92.50	NaN	0	very good	Very Good	Very Good	Very Good
475	476	SIGMA	18	2	12	3	17	15	67	55.83	NaN	2	poor	poor	Poor	Poor
476	477	SIGMA	20	6	16	11	20	14	87	72.50	NaN	1	good	Good	Good	Good
477	478	SIGMA	20	0	18	13	20	18	89	74.17	NaN	1	very good	Very Good	Very Good	Very Good
478	479	SIGMA	20	20	5	19	18	14	96	80.00	NaN	1	poor	poor	Poor	Poor
479	480	SIGMA	20	16	18	19	20	19	112	93.33	NaN	0	very good	Very Good	Very Good	Very Good

480 rows × 17 columns

 ${\tt DataFrame} \ \, {\tt of} \ \, {\tt students} \ \, {\tt who} \ \, {\tt failed} \ \, {\tt in} \ \, {\tt subjects} \colon \\$

```
S.NO
           SECTION DV
                           M2
                                PP
                                     BEEE FL
                                                 FIMS
                                                        Total
                                                                 Percentage Grade \
20
        21
               ALPHA
                        4
                             2
                                  5
                                         3
                                                     9
                                                            39
                                            16
                                                                       32.50
                                                                               Fail
27
        28
               ALPHA
                        5
                             4
                                  3
                                        12
                                            13
                                                     5
                                                            42
                                                                       35.00
                                                                               Fail
57
        58
               ALPHA
                        2
                             2
                                  4
                                        10
                                            10
                                                     3
                                                            31
                                                                       25.83
                                                                               Fail
                                  7
75
        76
                BETA
                        5
                             8
                                        15
                                            10
                                                     2
                                                            47
                                                                       39.17
                                                                               Fail
82
        83
                BETA
                        2
                             0
                                  2
                                         0
                                             0
                                                     0
                                                             4
                                                                       3.33
                                                                               Fail
88
        89
                BETA
                         2
                            17
                                  0
                                         3
                                            15
                                                     2
                                                            39
                                                                       32.50
                                                                               Fail
147
       148
               DELTA
                        9
                             5
                                            13
                                                     4
                                                            45
                                                                      37.50
                                  6
                                         8
                                                                               Fail
                        7
160
       161
               DELTA
                             0
                                 14
                                         5
                                            10
                                                     5
                                                            41
                                                                       34.17
                                                                               Fail
                                                            43
178
       179
               DELTA
                       13
                             0
                                  3
                                         2
                                            10
                                                    15
                                                                       35.83
                                                                               Fail
180
       181
               SIGMA
                        9
                             3
                                  4
                                         2
                                            10
                                                    15
                                                            43
                                                                       35.83
                                                                               Fail
             EPSILON
197
       198
                       11
                             1
                                  1
                                         2
                                            10
                                                     9
                                                            34
                                                                       28.33
                                                                               Fail
206
       207
             EPSILON
                        6
                             6
                                  2
                                         3
                                            10
                                                    11
                                                            38
                                                                      31.67
                                                                               Fail
210
       211
             EPSILON
                        0
                             0
                                  0
                                         0
                                             0
                                                     0
                                                             0
                                                                       0.00
                                                                               Fail
226
       227
             EPSILON
                        8
                             0
                                  3
                                         0
                                            10
                                                    14
                                                            35
                                                                      29.17
                                                                               Fail
229
       230
             EPSILON
                       13
                             2
                                  5
                                         9
                                            10
                                                    10
                                                            49
                                                                      40.83
                                                                               Fail
235
       236
             EPSILON
                        9
                             5
                                  5
                                         1
                                            10
                                                    11
                                                            41
                                                                      34.17
                                                                               Fail
255
               GAMMA
                             0
                                  5
                                                            49
                                                                       40.83
       256
                       14
                                        11
                                             8
                                                    11
                                                                               Fail
               GAMMA
                             2
260
       261
                       12
                                  6
                                         6
                                             6
                                                    11
                                                            43
                                                                      35.83
                                                                               Fail
               GAMMA
                             3
263
       264
                       14
                                  5
                                            13
                                                     6
                                                            49
                                                                       40.83
                                                                               Fail
       279
               GAMMA
                                  6
                                         7
278
                       10
                             3
                                            11
                                                     8
                                                            45
                                                                      37.50
                                                                               Fail
               GAMMA
                                  3
                                         8
288
       289
                       18
                             0
                                            17
                                                     3
                                                            49
                                                                       40.83
                                                                               Fail
               GAMMA
298
       299
                       15
                             1
                                  2
                                         7
                                            10
                                                     2
                                                            37
                                                                      30.83
                                                                               Fail
               GAMMA
299
       300
                       17
                             1
                                  3
                                         3
                                            11
                                                    12
                                                            47
                                                                      39.17
                                                                               Fail
302
       303
               OMEGA
                        0
                             0
                                  0
                                         0
                                             0
                                                     0
                                                             0
                                                                       0.00
                                                                               Fail
303
       304
               OMEGA
                        5
                             0
                                  3
                                        11
                                             7
                                                    10
                                                                      30.00
                                                            36
                                                                               Fail
309
       310
               OMEGA
                                  3
                       12
                             1
                                        10
                                             16
                                                     6
                                                            48
                                                                      40.00
                                                                               Fail
311
       312
               OMEGA
                        6
                             0
                                  1
                                        11
                                              9
                                                            31
                                                                      25.83
                                                                               Fail
       317
               OMEGA
                                              6
                                                     1
316
                       14
                             0
                                  1
                                         6
                                                            28
                                                                      23.33
                                                                               Fail
318
               OMEGA
                             0
                                  2
                                         6
                                                    10
                                                            45
                                                                       37.50
       319
                       11
                                            16
                                                                               Fail
323
       324
               SIGMA
                        9
                                  2
                             0
                                         3
                                            11
                                                     1
                                                            26
                                                                      21.67
                                                                               Fail
324
       325
               SIGMA
                             0
                                            10
                                                     4
                                                            26
                                                                      21.67
                                                                               Fail
325
       326
               SIGMA
                        9
                             3
                                  3
                                        12
                                            10
                                                     5
                                                            42
                                                                      35.00
                                                                               Fail
                                                                       36.67
326
       327
               SIGMA
                        5
                             3
                                  9
                                        10
                                            10
                                                     7
                                                            44
                                                                               Fail
334
       335
               SIGMA
                       10
                             0
                                  4
                                            13
                                                     9
                                                            42
                                                                      35.00
                                                                               Fail
                                         6
340
       341
               SIGMA
                        7
                                  3
                             0
                                            13
                                                     8
                                                            31
                                                                       25.83
                                                                               Fail
       357
               SIGMA
                                                     9
356
                       14
                                  6
                                         8
                                            10
                                                            48
                                                                      40.00
                             1
                                                                               Fail
                                                                       38.33
359
       360
               SIGMA
                       12
                             3
                                  2
                                         7
                                            13
                                                     9
                                                            46
                                                                               Fail
                                         7
361
       362
                ZETA
                        0
                             0
                                  6
                                                     0
                                                            26
                                            13
                                                                      21.67
                                                                               Fail
364
       365
                ZETA
                             3
                                  3
                                         2
                                            10
                                                     9
                                                            32
                                                                       26.67
                                                                               Fail
                                                                       0.00
368
       369
                ZETA
                        0
                             0
                                  0
                                         0
                                             0
                                                     0
                                                             0
                                                                               Fail
372
       373
                ZETA
                        7
                             2
                                  2
                                         6
                                            10
                                                     7
                                                            34
                                                                       28.33
                                                                               Fail
378
       379
                ZETA
                        8
                             0
                                  2
                                         6
                                            15
                                                     8
                                                            39
                                                                      32.50
                                                                               Fail
380
       381
               OMEGA
                                                                        0.00
                                                                               Fail
```

```
393
                394
                        OMEGA
                                 2
                                      5
                                          1
                                                 2
                                                    10
                                                            6
                                                                   26
                                                                              21.67
                                                                                      Fail
         394
                395
                        OMEGA
                                12
                                      0
                                          6
                                                 4
                                                    10
                                                            9
                                                                   41
                                                                              34.17
                                                                                      Fail
         409
                410
                        OMEGA
                                12
                                      5
                                          1
                                                20
                                                    10
                                                            0
                                                                   48
                                                                              40.00
                                                                                      Fail
         416
                        OMEGA
                                 9
                                      0
                                                                    9
                                                                               7.50
                417
                                          0
                                                 0
                                                      0
                                                            0
                                                                                      Fail
         424
                425
                        SIGMA
                                 6
                                      1
                                          0
                                                 0
                                                      0
                                                            0
                                                                    7
                                                                               5.83
                                                                                      Fail
         430
                431
                        SIGMA
                                 6
                                      1
                                          9
                                                11
                                                      8
                                                           10
                                                                   45
                                                                              37.50
                                                                                      Fail
         444
                445
                        SIGMA
                                 5
                                      2
                                         11
                                                 0
                                                     10
                                                            0
                                                                   28
                                                                              23.33
                                                                                      Fail
         453
                454
                        SIGMA
                                 1
                                      5
                                          0
                                                 0
                                                      0
                                                             0
                                                                    6
                                                                               5.00
                                                                                      Fail
                        SIGMA
         457
                458
                                12
                                      3
                                          2
                                                 8
                                                      7
                                                           12
                                                                   44
                                                                              36.67
                                                                                      Fail
                                                                    0
         461
                462
                        SIGMA
                                 0
                                      0
                                          0
                                                 0
                                                      0
                                                            0
                                                                               0.00
                                                                                      Fail
         469
                470
                        SIGMA
                                 1
                                      1
                                          2
                                                 0
                                                     10
                                                            0
                                                                   14
                                                                              11.67
                                                                                      Fail
         474
                475
                        SIGMA
                                11
                                                 2
                                                           10
                                                                   37
                                                                              30.83
                                                                                      Fail
               backlogs Coding-skills PP Grade DV Grade
                                                                skills section
         20
                      5
                                   poor
                                              poor
                                                        Poor
                                                                  Poor
                                                                          alnha
         27
                       4
                                   poor
                                              poor
                                                        Poor
                                                                  Poor
                                                                          alpha
                       4
                                                                          alpha
         57
                                   poor
                                              poor
                                                        Poor
                                                                  Poor
         75
                       4
                                   poor
                                              poor
                                                        Poor
                                                                  Poor
                                                                          alpha
                       6
         82
                                   poor
                                              poor
                                                        Poor
                                                                  Poor
                                                                          alpha
         88
                       4
                                                        Poor
                                                                  Poor
                                                                          alpha
                                   poor
                                              poor
                       5
         147
                                   poor
                                              poor
                                                        Poor
                                                                  Poor
                                                                          alpha
                       4
         160
                                                    Average
                                                               Average
                                                                          alpha
                                average
                                          Average
                       3
                                              poor
         178
                                   poor
                                                        Poor
                                                                  Poor
                                                                          alpha
                       4
         180
                                   poor
                                              poor
                                                        Poor
                                                                  Poor
                                                                          alpha
                       4
                                                                          alpha
         197
                                   poor
                                              poor
                                                        Poor
                                                                  Poor
         206
                       4
                                   poor
                                              poor
                                                        Poor
                                                                  Poor
                                                                          alpha
                       6
                                                                          alpha
         210
                                   poor
                                              poor
                                                        Poor
                                                                  Poor
         226
                       4
                                   poor
                                              poor
                                                        Poor
                                                                  Poor
                                                                          alpha
         229
                       3
                                   poor
                                              poor
                                                        Poor
                                                                  Poor
                                                                          alpha
                       4
         235
                                   poor
                                              poor
                                                        Poor
                                                                  Poor
                                                                          alpha
                       3
                                                        Poor
                                                                  Poor
         255
                                                                          alpha
                                   poor
                                              poor
         260
                       4
                                                        Poor
                                                                           alpha
                                   poor
                                              poor
                                                                  Poor
                       4
         263
                                                                          alpha
                                                        Poor
                                                                  Poor
                                   poor
                                              poor
         278
                       4
                                   poor
                                              poor
                                                        Poor
                                                                  Poor
                                                                          alpha
                       4
                                                                          alpha
         288
                                                        Poor
                                                                  Poor
                                   poor
                                              poor
         298
                       4
                                                                          alpha
                                   poor
                                              poor
                                                        Poor
                                                                  Poor
                      3
         299
                                                        Poor
                                   poor
                                              poor
                                                                  Poor
                                                                          alpha
         302
                       6
                                                        Poor
                                   poor
                                              poor
                                                                  Poor
                                                                          alpha
         303
                       4
                                                                          alpha
                                   poor
                                              poor
                                                        Poor
                                                                  Poor
         309
                       3
                                                        Poor
                                                                  Poor
                                                                          alpha
                                   poor
                                              poor
         311
                       5
                                                                          alpha
                                                        Poor
                                                                  Poor
                                              poor
                                   poor
         316
                       5
                                   poor
                                              poor
                                                        Poor
                                                                  Poor
                                                                           alpha
                       3
                                                                          alpha
         318
                                                        Poor
                                                                  Poor
                                   poor
                                              poor
         323
                       5
                                                        Poor
                                                                  Poor
                                                                           alpha
                                   poor
                                              poor
         324
                       5
                                                        Poor
                                                                  Poor
                                                                          alpha
                                   poor
                                              poor
         325
                       4
                                   poor
                                              poor
                                                        Poor
                                                                  Poor
                                                                          alpha
         326
                       4
                                   poor
                                              poor
                                                        Poor
                                                                  Poor
                                                                          alpha
         334
                       4
                                   poor
                                              poor
                                                        Poor
                                                                  Poor
                                                                          alpha
         340
                       5
                                                                          alpha
                                                        Poor
                                                                  Poor
                                   poor
                                              poor
         356
                       4
                                   poor
                                              poor
                                                        Poor
                                                                  Poor
                                                                          alpha
                       4
         359
                                                        Poor
                                                                  Poor
                                                                          alpha
                                              poor
                                   poor
         361
                       5
                                              poor
                                                        Poor
                                                                  Poor
                                                                          alpha
                                   poor
                       5
         364
                                                                          alpha
                                                        Poor
                                                                  Poor
                                   poor
                                              poor
                       6
         368
                                   poor
                                              poor
                                                        Poor
                                                                  Poor
                                                                          alpha
         372
                       5
                                                        Poor
                                                                  Poor
                                                                          alpha
                                   poor
                                              poor
                       5
         378
                                   poor
                                              poor
                                                        Poor
                                                                  Poor
                                                                          alpha
         380
                       6
                                                        Poor
                                                                  Poor
                                                                          alpha
                                   poor
                                              poor
         388
                       3
                                   poor
                                              poor
                                                        Poor
                                                                  Poor
                                                                          alpha
         393
                       5
                                                        Poor
                                                                  Poor
                                                                          alpha
                                   poor
                                              poor
         394
                       4
                                   poor
                                              poor
                                                        Poor
                                                                  Poor
                                                                          alpha
                       3
         409
                                                        Poor
                                                                  Poor
                                                                          alpha
                                   poor
                                              poor
         416
                       6
                                   poor
                                              poor
                                                        Poor
                                                                  Poor
                                                                          alpha
         424
                       6
                                                        Poor
                                                                  Poor
                                                                          alpha
                                   poor
                                              poor
                       4
         430
                                   poor
                                              poor
                                                        Poor
                                                                  Poor
                                                                          alpha
         444
                       4
                                   poor
                                              poor
                                                        Poor
                                                                  Poor
                                                                          alpha
         453
                       6
                                   poor
                                              poor
                                                        Poor
                                                                  Poor
                                                                          alpha
         457
                                                        Poor
                                                                  Poor
                                                                          alpha
                                   poor
                                              poor
         461
                       6
                                   poor
                                              poor
                                                        Poor
                                                                  Poor
                                                                          alpha
                       5
         469
                                                        Poor
                                                                  Poor
                                                                          alpha
                                   poor
                                              poor
         474
                       4
                                   poor
                                              poor
                                                        Poor
                                                                  Poor
                                                                          alpha
In [105... df.loc[df['Total'] > 110, ['Grade']] = "A+"
          df.loc[(df['Total'] > 90) & (df['Total'] <= 110), ['Grade']] = "A"</pre>
          df.loc[(df['Total'] > 70) & (df['Total'] <= 90), ['Grade']] = "B+"</pre>
          df.loc[(df['Total'] > 50) & (df['Total'] <= 70), ['Grade']] = "B"</pre>
          df.loc[df['Total'] <= 50, ['Grade']] = "Fail"</pre>
          failed_students_Total = df[df['Total'] < 50]</pre>
          print("DataFrame of students who failed in subjects:")
          print(failed_students_Total)
         DataFrame of students who failed in subjects:
               S.NO SECTION DV M2 PP BEEE FL FIMS
                                                                        Percentage Grade \
                                                                Total
```

388

20

21

ALPHA

4 2 5

3 16

9

39

32.50 Fail

389

OMEGA

10 12

1

8 15

3

49

40.83

Fail

27	28	ALPHA	5	4	3	12	13	5	42	35.00	Fail
57	58	ALPHA	2	2	4	10	10	3	31	25.83	Fail
75	76	BETA	5	8	7	15	10	2	47	39.17	Fail
82	83	BETA	2	0	2	0	0	0	4	3.33	Fail
88	89	BETA	2	17	0	3	15	2	39	32.50	Fail
147	148	DELTA	9	5	6	8	13	4	45	37.50	Fail
160	161	DELTA	7	0	14	5	10	5	41	34.17	Fail
178	179	DELTA	13	0	3	2	10	15	43	35.83	Fail
180	181	SIGMA	9	3	4	2	10	15	43	35.83	Fail
197	198	EPSILON	11	1	1	2	10	9	34	28.33	Fail
206	207	EPSILON	6	6	2	3	10	11	38	31.67	Fail
210	211	EPSILON	0	0	0	0	0	0	0	0.00	Fail
226	227	EPSILON	8	0	3	0	10	14	35	29.17	Fail
229	230	EPSILON	13	2	5	9	10	10	49	40.83	Fail
235	236		9	5	5	1	10	11	49		Fail
255	256	EPSILON	14	0	5	11	8	11	41	34.17	Fail
260	261	GAMMA		2	6			11	43	40.83	Fail
		GAMMA	12	3	5	6 8	6 13	6	43 49	35.83	Fail
263	264	GAMMA	14							40.83	
278	279	GAMMA	10	3	6	7	11	8	45	37.50	Fail
288	289	GAMMA	18	0	3	8	17	3	49	40.83	Fail
298	299	GAMMA	15	1	2	7	10	2	37	30.83	Fail
299	300	GAMMA	17	1	3	3	11	12	47	39.17	Fail
302	303	OMEGA	0	0	0	0	0	0	0	0.00	Fail
303	304	OMEGA	5	0	3	11	7	10	36	30.00	Fail
309	310	OMEGA	12	1	3	10	16	6	48	40.00	Fail
311	312	OMEGA	6	0	1	11	9	4	31	25.83	Fail
316	317	OMEGA	14	0	1	6	6	1	28	23.33	Fail
318	319	OMEGA	11	0	2	6	16	10	45	37.50	Fail
323	324	SIGMA	9	0	2	3	11	1	26	21.67	Fail
324	325	SIGMA	6	0	3	3	10	4	26	21.67	Fail
325	326	SIGMA	9	3	3	12	10	5	42	35.00	Fail
326	327	SIGMA	5	3	9	10	10	7	44	36.67	Fail
334	335	SIGMA	10	0	4	6	13	9	42	35.00	Fail
340	341	SIGMA	7	0	3	0	13	8	31	25.83	Fail
356	357	SIGMA	14	1	6	8	10	9	48	40.00	Fail
359	360	SIGMA	12	3	2	7	13	9	46	38.33	Fail
361	362	ZETA	0	0	6	7	13	0	26	21.67	Fail
364	365	ZETA	5	3	3	2	10	9	32	26.67	Fail
368	369	ZETA	0	0	0	0	0	0	0	0.00	Fail
372	373	ZETA	7	2	2	6	10	7	34	28.33	Fail
378	379	ZETA	8	0	2	6	15	8	39	32.50	Fail
380	381	OMEGA	0	0	0	0	0	0	0	0.00	Fail
388	389	OMEGA	10	12	1	8	15	3	49	40.83	Fail
393	394	OMEGA	2	5	1	2	10	6	26	21.67	Fail
394	395	OMEGA	12	0	6	4	10	9	41	34.17	Fail
409	410	OMEGA	12	5	1	20	10	0	48	40.00	Fail
416	417	OMEGA	9	0	0	0	0	0	9	7.50	Fail
424	425	SIGMA	6	1	0	0	0	0	7	5.83	Fail
430	431	SIGMA	6	1	9	11	8	10	45	37.50	Fail
444	445	SIGMA	5	2	11	0	10	0	28	23.33	Fail
453	454	SIGMA	1	5	0	0	0	0	6	5.00	Fail
457	458	SIGMA	12	3	2	8	7	12	44	36.67	Fail
461	462	SIGMA	0	0	0	0	0	0	0	0.00	Fail
469	470	SIGMA	1	1	2	0	10	0	14	11.67	Fail
474	475	SIGMA	11	4	2	2	8	10	37	30.83	Fail
	backl	ogs Codin	g-sk	ills	PP_	Grade	DV_0	Grade	skills	section	

	backlogs	Coding-skills	PP_Grade	DV_Grade	skills	section
20	5	poor	poor	Poor	Poor	alpha
27	4	poor	poor	Poor	Poor	alpha
57	4	poor	poor	Poor	Poor	alpha
75	4	poor	poor	Poor	Poor	alpha
82	6	poor	poor	Poor	Poor	alpha
88	4	poor	poor	Poor	Poor	alpha
147	5	poor	poor	Poor	Poor	alpha
160	4	average	Average	Average	Average	alpha
178	3	poor	poor	Poor	Poor	alpha
180	4	poor	poor	Poor	Poor	alpha
197	4	poor	poor	Poor	Poor	alpha
206	4	poor	poor	Poor	Poor	alpha
210	6	poor	poor	Poor	Poor	alpha
226	4	poor	poor	Poor	Poor	alpha
229	3	poor	poor	Poor	Poor	alpha
235	4	poor	poor	Poor	Poor	alpha
255	3	poor	poor	Poor	Poor	alpha
260	4	poor	poor	Poor	Poor	alpha
263	4	poor	poor	Poor	Poor	alpha
278	4	poor	poor	Poor	Poor	alpha
288	4	poor	poor	Poor	Poor	alpha
298	4	poor	poor	Poor	Poor	alpha
299	3	poor	poor	Poor	Poor	alpha
302	6	poor	poor	Poor	Poor	alpha
303	4	poor	poor	Poor	Poor	alpha
309	3	poor	poor	Poor	Poor	alpha

```
311
                                            Poor
                                                      Poor
                                                             alpha
                         poor
                                  poor
             5
316
                         poor
                                  poor
                                            Poor
                                                      Poor
                                                              alpha
             3
318
                                            Poor
                                                      Poor
                                                              alpha
                                   poor
                        poor
             5
323
                         poor
                                   poor
                                            Poor
                                                      Poor
                                                              alpha
             5
                                                             alpha
324
                                                      Poor
                                            Poor
                        poor
                                  poor
             4
325
                        poor
                                  poor
                                            Poor
                                                      Poor
                                                              alpha
             4
326
                                            Poor
                                                      Poor
                                                              alpha
                        poor
                                  poor
             4
334
                         poor
                                  poor
                                            Poor
                                                      Poor
                                                              alpha
             5
340
                                            Poor
                                                      Poor
                                                              alpha
                        poor
                                  poor
             4
356
                         poor
                                   poor
                                            Poor
                                                      Poor
                                                              alpha
359
             4
                        poor
                                  poor
                                            Poor
                                                      Poor
                                                              alpha
            5
361
                         poor
                                   poor
                                            Poor
                                                      Poor
                                                              alpha
             5
364
                                                      Poor
                                                              alpha
                                  poor
                                            Poor
                        poor
            6
368
                        poor
                                  poor
                                            Poor
                                                      Poor
                                                              alpha
372
             5
                                            Poor
                                                      Poor
                                                              alpha
                        poor
                                  poor
            5
378
                        poor
                                  poor
                                            Poor
                                                      Poor
                                                              alpha
             6
380
                        poor
                                  poor
                                            Poor
                                                      Poor
                                                              alpha
388
            3
                                                              alpha
                         poor
                                   poor
                                            Poor
                                                      Poor
393
             5
                        poor
                                  poor
                                            Poor
                                                      Poor
                                                              alpha
             4
394
                         poor
                                   poor
                                            Poor
                                                      Poor
                                                              alpha
409
             3
                                            Poor
                                                      Poor
                                                              alpha
                        poor
                                  poor
            6
                                                              alpha
416
                         poor
                                  poor
                                            Poor
                                                      Poor
424
             6
                                            Poor
                                                      Poor
                                                              alpha
                        poor
                                  poor
430
             4
                         poor
                                   poor
                                            Poor
                                                      Poor
                                                              alpha
444
             4
                                                              alpha
                        poor
                                  poor
                                            Poor
                                                      Poor
            6
453
                                            Poor
                                                              alpha
                         poor
                                   poor
                                                      Poor
457
             4
                         poor
                                   poor
                                            Poor
                                                      Poor
                                                              alpha
            6
                                                              alpha
461
                         poor
                                   poor
                                            Poor
                                                      Poor
469
             5
                                                      Poor
                                                              alpha
                        poor
                                  poor
                                            Poor
474
             4
                        poor
                                  poor
                                            Poor
                                                      Poor
                                                              alpha
```

```
In [107... def assign_grade(percentage):
             if percentage >= 90:
                 return 'A'
             elif percentage >= 80:
                 return 'B+'
             elif percentage >= 70:
                 return 'B'
             elif percentage >= 60:
                 return 'C+'
             elif percentage >=50:
                 return 'C'
             elif percentage >=40:
                 return 'D'
             else:
                 return 'F'
         df['Grade'] = df['Percentage'].apply(assign_grade)
         df
```

Out[107...

	S.NO	SECTION	DV	M2	PP	BEEE	FL	FIMS	Total	Percentage	Grade	backlogs	Coding- skills	PP_Grade	DV_Grade	skills
0	1	ALPHA	12	0	17	9	19	15	72	60.00	C+	2	good	Good	Good	Good
1	2	ALPHA	19	12	16	16	18	3	84	70.00	В	1	good	Good	Good	Good
2	3	ALPHA	18	14	18	18	18	16	102	85.00	B+	0	very good	Very Good	Very Good	Very Good
3	4	ALPHA	15	9	19	17	19	15	94	78.33	В	1	very good	Very Good	Very Good	Very Good
4	5	ALPHA	18	17	19	19	20	18	111	92.50	А	0	very good	Very Good	Very Good	Very Good
475	476	SIGMA	18	2	12	3	17	15	67	55.83	С	2	poor	poor	Poor	Poor
476	477	SIGMA	20	6	16	11	20	14	87	72.50	В	1	good	Good	Good	Good
477	478	SIGMA	20	0	18	13	20	18	89	74.17	В	1	very good	Very Good	Very Good	Very Good
478	479	SIGMA	20	20	5	19	18	14	96	80.00	B+	1	poor	poor	Poor	Poor
479	480	SIGMA	20	16	18	19	20	19	112	93.33	А	0	very good	Very Good	Very Good	Very Good

480 rows × 17 columns

```
In [109... df['backlogs'] = (df[['DV', 'M2', 'PP', 'BEEE', 'FL', 'FIMS']] < 10).sum(axis=1)
df</pre>
```

480 rows × 17 columns

Out[111... SECTION SIGMA 73 GAMMA 43 **EPSILON** 41 OMEGA 41 **DELTA** 35 BETA 32 **ALPHA** 26 ZETA 13

Out[113...

Name: count, dtype: int64

In [113... df['backlogs'] = (df[['DV', 'M2', 'PP', 'BEEE', 'FL', 'FIMS']] < 10).sum(axis=1)
df</pre>

	S.NO	SECTION	DV	M2	PP	BEEE	FL	FIMS	Total	Percentage	Grade	backlogs	Coding- skills	PP_Grade	DV_Grade	skills
0	1	ALPHA	12	0	17	9	19	15	72	60.00	C+	2	good	Good	Good	Good
1	2	ALPHA	19	12	16	16	18	3	84	70.00	В	1	good	Good	Good	Good
2	3	ALPHA	18	14	18	18	18	16	102	85.00	B+	0	very good	Very Good	Very Good	Very Good
3	4	ALPHA	15	9	19	17	19	15	94	78.33	В	1	very good	Very Good	Very Good	Very Good
4	5	ALPHA	18	17	19	19	20	18	111	92.50	Α	0	very good	Very Good	Very Good	Very Good
475	476	SIGMA	18	2	12	3	17	15	67	55.83	С	2	poor	poor	Poor	Poor
476	477	SIGMA	20	6	16	11	20	14	87	72.50	В	1	good	Good	Good	Good
477	478	SIGMA	20	0	18	13	20	18	89	74.17	В	1	very good	Very Good	Very Good	Very Good
478	479	SIGMA	20	20	5	19	18	14	96	80.00	B+	1	poor	poor	Poor	Poor
479	480	SIGMA	20	16	18	19	20	19	112	93.33	А	0	very good	Very Good	Very Good	Very Good

480 rows × 17 columns

Out[115...

		S.NO	SECTION	DV	M2	PP	BEEE	FL	FIMS	Total	Percentage	Grade	backlogs	Coding- skills	PP_Grade	DV_Grade	skills
	0	1	ALPHA	12	0	17	9	19	15	72	60.00	C+	2	good	Good	Good	Good
	1	2	ALPHA	19	12	16	16	18	3	84	70.00	В	1	good	Good	Good	Good
	2	3	ALPHA	18	14	18	18	18	16	102	85.00	B+	0	very good	Very Good	Very Good	Very Good
	3	4	ALPHA	15	9	19	17	19	15	94	78.33	В	1	very good	Very Good	Very Good	Very Good
	4	5	ALPHA	18	17	19	19	20	18	111	92.50	Α	0	very good	Very Good	Very Good	Very Good
4	75	476	SIGMA	18	2	12	3	17	15	67	55.83	С	2	poor	poor	Poor	Poor
4	76	477	SIGMA	20	6	16	11	20	14	87	72.50	В	1	good	Good	Good	Good
4	77	478	SIGMA	20	0	18	13	20	18	89	74.17	В	1	very good	Very Good	Very Good	Very Good
4	78	479	SIGMA	20	20	5	19	18	14	96	80.00	B+	1	poor	poor	Poor	Poor
4	79	480	SIGMA	20	16	18	19	20	19	112	93.33	Α	0	very good	Very Good	Very Good	Very Good

480 rows × 17 columns

```
In [117... less than 10 = df[
             (df['DV'] < 10)
              (df['M2'] < 10)
             (df['PP'] < 10)
              (df['BEEE'] < 10) |
             (df['FL'] < 10)
              (df['FIMS'] < 10)
         ]
         print("Students with less than 10 marks in at least one subject:")
         print(less than 10)
        Students with less than 10 marks in at least one subject:
             S.NO SECTION DV M2
                                    PP
                                        BEEE
                                              FL
                                                   FIMS
                                                         Total Percentage Grade
        0
                    ALPHA 12
                                0
                                    17
                                           9
                                                            72
                                                                      60.00
                1
                                               19
                                                     15
                                                                               C+
        1
                    ALPHA 19
                                12 16
                                          16
                                                      3
                                                                      70.00
                                              18
        3
                4
                    ALPHA 15
                                9
                                    19
                                               19
                                                            94
                                                                      78.33
                                          17
                                                     15
                                                                                В
        5
                6
                    ALPHA
                            17
                                16
                                    18
                                          10
                                               15
                                                     9
                                                            85
                                                                      70.83
                                                                                В
        8
                    ALPHA
                                18
                                               19
                                                                      68.33
                9
                            10
                                    0
                                          20
                                                     15
                                                            82
                                                                               C+
                                                                        . . .
        474
              475
                    SIGMA
                                4
                                    2
                                           2
                                               8
                                                                      30.83
                                                                               F
                            11
                                                     10
                                                            37
        475
              476
                    SIGMA
                            18
                                 2
                                    12
                                           3
                                               17
                                                     15
                                                            67
                                                                      55.83
                                                                                C
        476
              477
                    SIGMA
                                                                      72.50
                            20
                                6
                                    16
                                          11 20
                                                     14
                                                            87
                                                                                В
        477
              478
                    SIGMA 20
                                0 18
                                          13 20
                                                     18
                                                            89
                                                                      74.17
                                                                                В
                                          19 18
                                                     14
        478
              479
                    SIGMA 20 20
                                    5
                                                            96
                                                                      80.00
                                                                               B+
             backlogs Coding-skills
                                       \mathsf{PP}\_\mathsf{Grade}
                                                   DV_Grade
                                                                skills section
        0
                    2
                                            Good
                                                       Good
                                                                   Good
                                                                          alpha
                                good
        1
                    1
                                good
                                                                          alpha
                                           Good
                                                       Good
                                                                   Good
        3
                     1
                           very good
                                      Very Good
                                                  Very Good
                                                             Very Good
                                                                          alpha
        5
                    1
                                      Very Good
                                                  Very Good
                                                             Very Good
                                                                          alpha
                           very good
        8
                     1
                                poor
                                           poor
                                                       Poor
                                                                   Poor
                                                                          alpha
                                 . . .
                                            . . .
                                                        . . .
                                                                   . . .
        474
                     4
                                poor
                                            poor
                                                       Poor
                                                                   Poor
                                                                          alpha
        475
                    2
                                                                  Poor
                                                       Poor
                                                                          alpha
                                poor
                                            poor
        476
                    1
                                good
                                            Good
                                                       Good
                                                                   Good
                                                                          alpha
        477
                    1
                           very good
                                      Very Good
                                                       Good
                                                                  Good
                                                                          alpha
                                                  Very
        478
                    1
                                poor
                                            poor
                                                       Poor
                                                                   Poor
                                                                          alpha
```

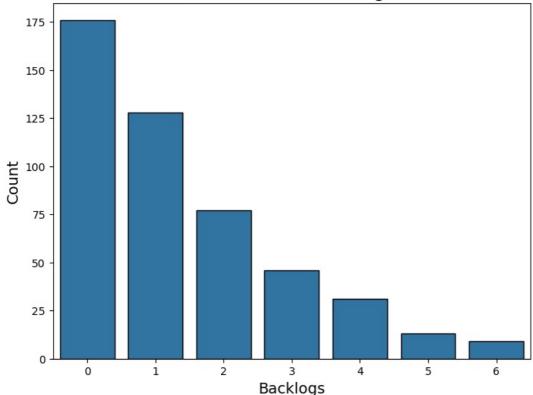
```
[304 rows x 17 columns]
```

```
In [119... j=df.sort_values('backlogs')
j
```

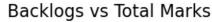
ut[119		S.NO	SECTION	DV	M2	PP	BEEE	FL	FIMS	Total	Percentage	Grade	backlogs	Coding- skills	PP_Grade	DV_Grade	skills
	239	240	EPSILON	17	17	14	20	18	17	103	85.83	B+	0	average	Average	Average	Average
	194	195	EPSILON	18	11	19	10	20	20	98	81.67	B+	0	very good	Very Good	Very Good	Very Good
	195	196	EPSILON	20	12	18	17	20	20	107	89.17	B+	0	very good	Very Good	Very Good	Very Good
	201	202	EPSILON	18	17	15	18	19	19	106	88.33	B+	0	good	Good	Good	Good
	202	203	EPSILON	16	11			13	19	89	74.17	В	0	good	Good	Good	Good
	380	381	OMEGA	0	0		0		0	0	0.00	 F	6	poor	poor	Poor	Poor
	302	303	OMEGA	0	0	0	0	0	0	0	0.00	F	6	poor	poor	Poor	Poor
	453	454	SIGMA	1	5	0	0	0	0	6	5.00	F	6	poor	poor	Poor	Poor
	368	369	ZETA	0	0	0	0	0	0	0	0.00	F	6	poor	poor	Poor	Poor
	461	462	SIGMA	0	0	0	0	0	0	0	0.00	F	6	poor	poor	Poor	Poor
	480 rd	ows × 1	7 columns														
121	back high high prin	log_co est_ba est_ba t(f"Th	ounts = (dacklog_sub acklog_cod ne subject	df.i bjec unt : t wi	loc[t = b = bac th th	:, 2 back cklog ne h:	:] < 10 log_coung_cound ighest	0).s unts ts.m num	um() .idxma ax() ber of	x() back	, errors='c logs is '{h packlogs' w	ighest ₋	_backlog_s		' with {hi	ghest_back	(log_co
C P E F	back prin prin Numbe OV 42 PP BEEE	log_co t("Num t(back	ounts = (onber of backlog_counts) oacklogs if 66 226 135 127	df.idacklo	loc[:	:, 2 in ea	:] < 10 ach sul	9).s	um()	meric	, errors='c	oerce'					
7 F () k () F C S	Grade Dackl Codin PP_Gr DV_Gr Skill Secti	ntage ogs g-skil ade ade s	() () ()	9													
125	df.i abse alph abse prin	nt_cou a_code nt_alp t("Abs	, 2:] = d ⁻ unts = df	ilo stri ent_ n al	c[:, ng.as count	2:] scii ts.ma	isna(_uppero ap(alpl	suicase na_c	n() [i] fo odes)	ri i	, errors='c n range(len)}			
C	DV 42 PP BEEE FIMS Fotal Perce Grade Dackl Codin PP_Gr DV_Gr skill	ntage ogs g-skil ade ade	n alphabe , , , , , , , , , , , , , , , , , , ,	A A A A A A A A V V V V V V V V V V V V	al co	odes	for ea	ach s	subjec	t:							

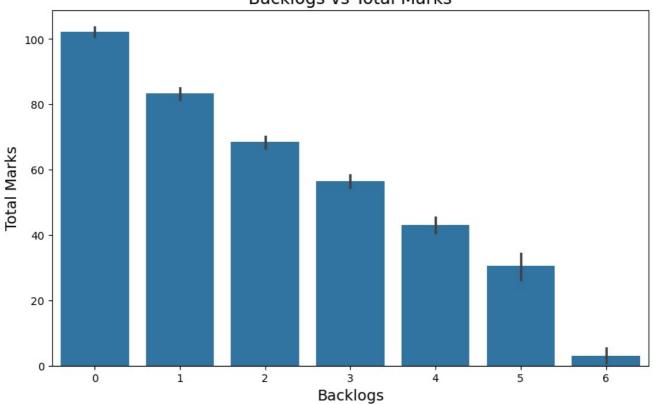
```
False
In [131... print(df.columns)
        dtype='object')
In [133... print(df['Grade'].notna().sum())
In [135... if df['Grade'].notna().sum() > 0:
             df['Grade'].value_counts().plot(kind='bar', figsize=(8, 6), color='skyblue', edgecolor='black')
             plt.title('Distribution of Grades', fontsize=16)
             plt.xlabel('Grades', fontsize=14)
plt.ylabel('Count', fontsize=14)
             plt.xticks(rotation=0)
             plt.grid(axis='y', linestyle='--', alpha=0.7)
             plt.show()
             print("The 'Grade' column is empty or contains no valid data.")
        The 'Grade' column is empty or contains no valid data.
In [137_ print(df.head())
           S.NO SECTION
                        DV
                            M2 PP
                                    BEEE FL
                                              FIMS
                                                    Total
                                                           Percentage Grade
                                       9
             1
                 ALPHA 12
                               17
                                          19
                                                       72
                                                                60.00
                        19
                            12
                                                       84
        1
              2
                  ALPHA
                                16
                                      16
                                          18
                                                 3
                                                                70.00
                                                                        NaN
        2
              3
                  ALPHA
                        18
                            14
                                18
                                      18
                                          18
                                                16
                                                      102
                                                                85.00
                                                                        NaN
                  ALPHA
        3
              4
                        15
                             9
                                      17
                                          19
                                                15
                                                       94
                                                                78.33
                                                                        NaN
                                19
                 ALPHA 18
                            17 19
                                      19
                                          20
           backlogs Coding-skills PP Grade DV Grade skills section
        0
                                                              NaN
                 2
                             NaN
                                      NaN
                                               NaN
                                                      NaN
        1
                  1
        2
                  0
                             NaN
                                      NaN
                                               NaN
                                                      NaN
                                                              NaN
        3
                  1
                             NaN
                                      NaN
                                               NaN
                                                      NaN
                                                              NaN
                  0
                             NaN
                                      NaN
                                               NaN
                                                      NaN
                                                              NaN
In [139... plt.figure(figsize=(8, 6))
         sns.countplot(x='backlogs', data=df, edgecolor='black')
         plt.title('Distribution of Backlogs', fontsize=16)
         plt.xlabel('Backlogs', fontsize=14)
         plt.ylabel('Count', fontsize=14)
         plt.show()
                                      Distribution of Backlogs
```

In [129... print(df.empty)

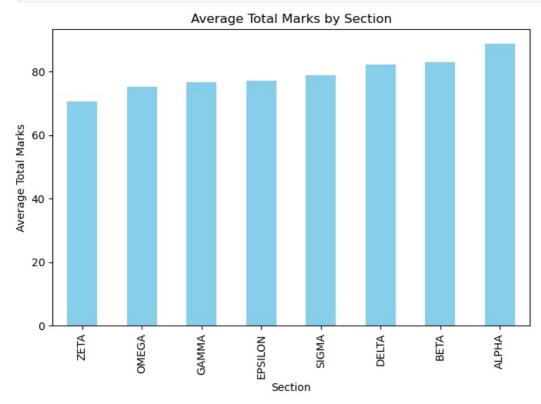


```
In [141...
plt.figure(figsize=(10, 6))
sns.barplot(x='backlogs', y='Total', data=df)
plt.title('Backlogs vs Total Marks', fontsize=16)
plt.xlabel('Backlogs', fontsize=14)
plt.ylabel('Total Marks', fontsize=14)
plt.show()
```





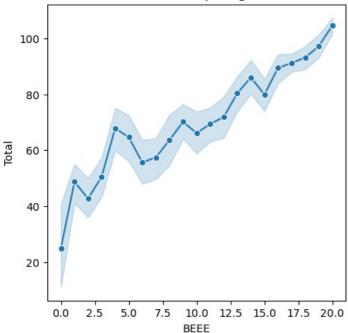
```
avg_by_section = df.groupby("SECTION")["Total"].mean().sort_values()
plt.figure(figsize=(8, 5))
avg_by_section.plot(kind="bar", color="skyblue")
plt.title("Average Total Marks by Section")
plt.xlabel("Section")
plt.ylabel("Average Total Marks")
plt.show()
```



```
In [145... plt.figure(figsize=(5, 5))
    sns.lineplot(x="BEEE", y="Total", data=df, marker="o")
    plt.xlabel("BEEE")
    plt.ylabel("Total")
```

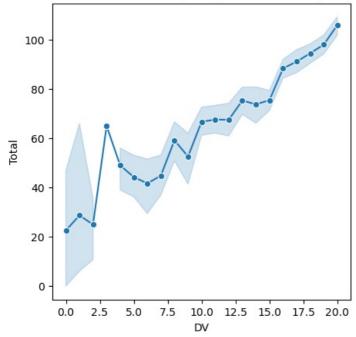
```
plt.title("Marks in BEEE comparing with Total")
plt.show()
```

Marks in BEEE comparing with Total



```
In [147... df.sort_values(["Total"], ascending=True)
  plt.figure(figsize=(5, 5))
  sns.lineplot(x="DV", y="Total", data=df, marker="o")
  plt.xlabel("DV")
  plt.ylabel("Total")
  plt.title("Marks in DV comparing with Percentage")
  plt.show()
```

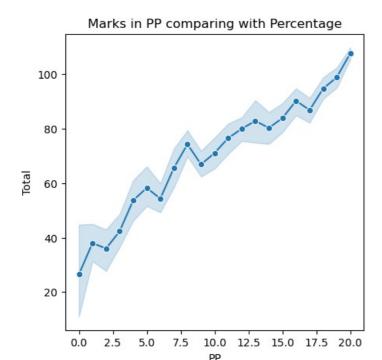
Marks in DV comparing with Percentage

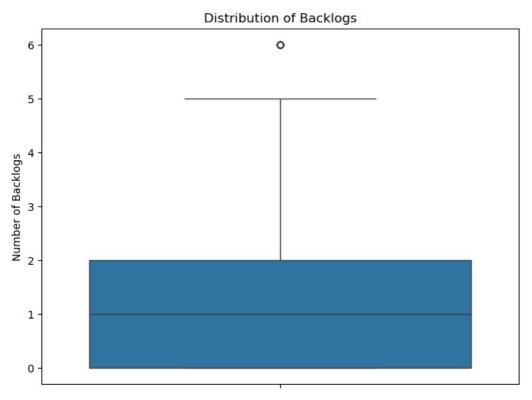


```
In [149... plt.figure(figsize=(5, 5))
    sns.lineplot(x="PP", y="Total", data=df, marker="o")
    plt.xlabel("PP")
    plt.ylabel("Total")
    plt.title("Marks in PP comparing with Percentage")
```

Out[149... Text(0.5, 1.0, 'Marks in PP comparing with Percentage')

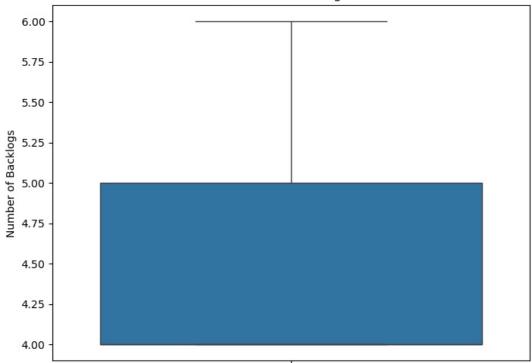
```
In [150...
plt.figure(figsize=(8, 6))
sns.boxplot(y=df['backlogs'])
plt.title("Distribution of Backlogs")
plt.ylabel("Number of Backlogs")
plt.show()
```



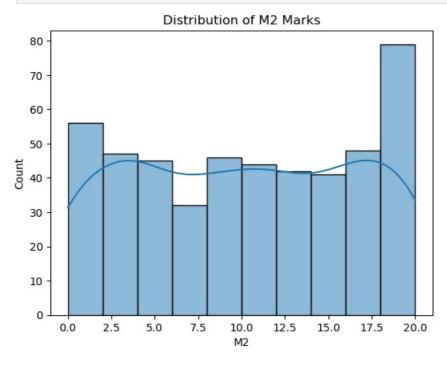


```
In [153... filtered_df = df[df['backlogs'] > 3]
    plt.figure(figsize=(8, 6))
    sns.boxplot(y=filtered_df['backlogs'])
    plt.title("Above 3 backlogs")
    plt.ylabel("Number of Backlogs")
    plt.show()
```

Above 3 backlogs

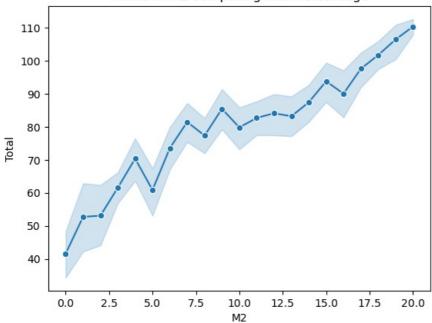


```
In [155... sns.histplot(df['M2'], kde=True)
   plt.title('Distribution of M2 Marks')
   plt.show()
```



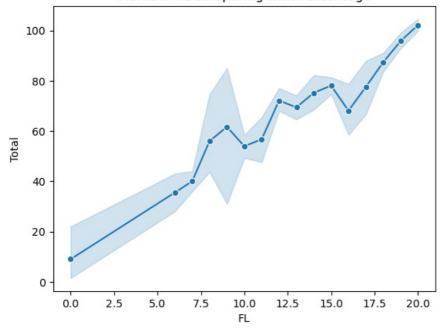
```
In [157...
sns.lineplot(x="M2", y="Total", data=df, marker="o")
plt.xlabel("M2")
plt.ylabel("Total")
plt.title("Marks in M2 comparing with Percentage")
plt.show()
```

Marks in M2 comparing with Percentage



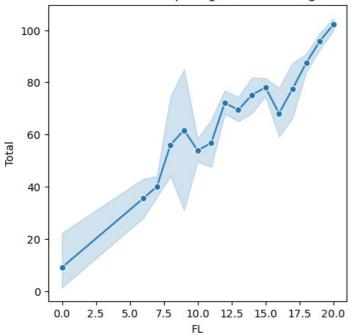
```
In [158_
sns.lineplot(x="FL", y="Total", data=df, marker="o")
plt.xlabel("FL")
plt.ylabel("Total")
plt.title("Marks in FL comparing with Percentage")
plt.show()
```

Marks in FL comparing with Percentage



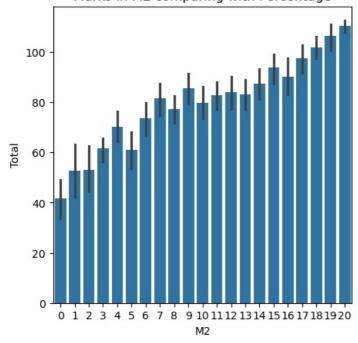
```
In [160...
plt.figure(figsize=(5, 5))
sns.lineplot(x="FL", y="Total", data=df, marker="o")
plt.xlabel("FL")
plt.ylabel("Total")
plt.title("Marks in FL comparing with Percentage")
plt.show()
```

Marks in FL comparing with Percentage



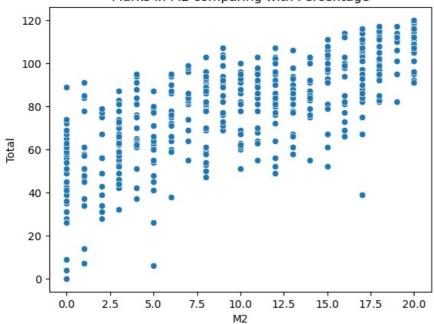
```
In [162...
plt.figure(figsize=(5, 5))
sns.barplot(x="M2", y="Total", data=df)
plt.xlabel("M2")
plt.ylabel("Total")
plt.title("Marks in M2 comparing with Percentage")
plt.show()
```

Marks in M2 comparing with Percentage



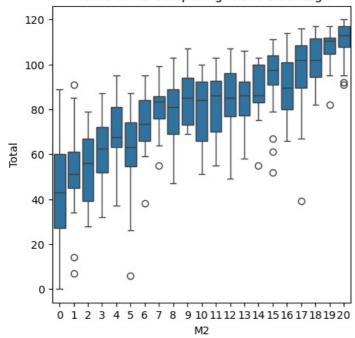
```
In [163...
sns.scatterplot(x="M2", y="Total", data=df, marker="o")
plt.xlabel("M2")
plt.ylabel("Total")
plt.title("Marks in M2 comparing with Percentage")
plt.show()
```

Marks in M2 comparing with Percentage



```
In [165... plt.figure(figsize=(5, 5))
    sns.boxplot(x="M2", y="Total", data=df)
    plt.xlabel("M2")
    plt.ylabel("Total")
    plt.title("Marks in M2 comparing with Percentage")
    plt.show()
```

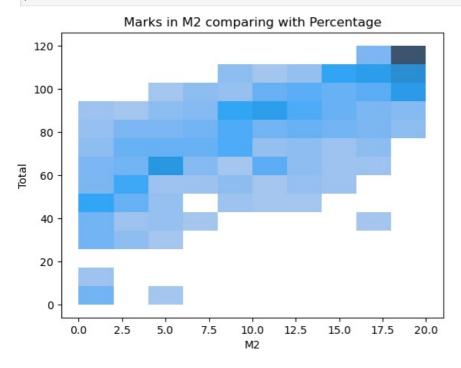
Marks in M2 comparing with Percentage



```
In [166...
plt.figure(figsize=(5, 5))
sns.scatterplot(x="M2", y="Total", data=df, marker="o")
plt.xlabel("M2")
plt.ylabel("Total")
plt.title("Marks in M2 comparing with Total")
plt.show()
```


M2

```
In [167... sns.histplot(x="M2", y="Total", data=df)
  plt.xlabel("M2")
  plt.ylabel("Total")
  plt.title("Marks in M2 comparing with Percentage")
  plt.show()
```



```
In [170... def assign_grade(PP):
    if PP >=18 :
        return "very good"

    elif PP >=15 :
        return 'good'
    elif PP >= 13:
        return 'average'
    else:
        return 'poor'
    df['Coding-skills'] = df['PP'].apply(assign_grade)
    df
```

	S.NO	SECTION	DV	M2	PP	BEEE	FL	FIMS	Total	Percentage	Grade	backlogs	Coding- skills	PP_Grade	DV_Grade	skills
0	1	ALPHA	12	0	17	9	19	15	72	60.00	NaN	2	good	NaN	NaN	NaN
1	2	ALPHA	19	12	16	16	18	3	84	70.00	NaN	1	good	NaN	NaN	NaN
2	3	ALPHA	18	14	18	18	18	16	102	85.00	NaN	0	very good	NaN	NaN	NaN
3	4	ALPHA	15	9	19	17	19	15	94	78.33	NaN	1	very good	NaN	NaN	NaN
4	5	ALPHA	18	17	19	19	20	18	111	92.50	NaN	0	very good	NaN	NaN	NaN
475	476	SIGMA	18	2	12	3	17	15	67	55.83	NaN	2	poor	NaN	NaN	NaN
476	477	SIGMA	20	6	16	11	20	14	87	72.50	NaN	1	good	NaN	NaN	NaN
477	478	SIGMA	20	0	18	13	20	18	89	74.17	NaN	1	very good	NaN	NaN	NaN
478	479	SIGMA	20	20	5	19	18	14	96	80.00	NaN	1	poor	NaN	NaN	NaN
479	480	SIGMA	20	16	18	19	20	19	112	93.33	NaN	0	very good	NaN	NaN	NaN

480 rows × 17 columns

```
In [172... def assign grade(PP):
             if 18 <= PP <= 20:
                 return 'Very Good'
             elif 13 <= PP <= 14:
                 return 'Average'
             elif 13 <= PP <= 17:
                 return 'Good'
             else:
                 return 'poor'
         df['PP_Grade'] = df['PP'].apply(assign_grade)
         print(df)
             S.NO SECTION DV M2 PP
                                       BEEE
                                             FL FIMS Total Percentage Grade \
        0
                1
                    ALPHA
                               0
                                   17
                                          9
                                             19
                                                   15
                                                          72
                                                                    60.00
        1
                    ALPHA
                           19
                              12
                                         16
                                             18
                                                    3
                                                          84
                                                                    70.00
                2
                                   16
                                                                            NaN
        2
                3
                    ALPHA
                           18
                               14
                                   18
                                         18
                                             18
                                                   16
                                                          102
                                                                    85.00
                                                                            NaN
                    ALPHA
        3
                           15
                               9
                                  19
                                         17
                                             19
                                                   15
                                                          94
                                                                    78.33
                                                                            NaN
        4
                5
                    ALPHA 18
                              17 19
                                         19
                                             20
                                                   18
                                                          111
                                                                    92.50
                                                                            NaN
                                                          . . .
                    SIGMA
                               2
                                             17
                                                                    55.83
        475
              476
                           18
                                   12
                                         3
                                                   15
                                                          67
                                                                            NaN
              477
                    SIGMA
        476
                           20
                               6
                                  16
                                         11 20
                                                   14
                                                          87
                                                                    72.50
                                                                            NaN
                    SIGMA
        477
              478
                           20
                               0 18
                                         13 20
                                                   18
                                                          89
                                                                    74.17
                                                                            NaN
        478
              479
                    SIGMA
                           20
                               20
                                   5
                                         19
                                             18
                                                   14
                                                          96
                                                                    80.00
                                                                            NaN
                    SIGMA
                           20
        479
              480
                               16
                                   18
                                         19
                                             20
                                                   19
                                                          112
                                                                    93.33
                                                                            NaN
             backlogs Coding-skills
                                      PP_Grade DV_Grade skills section
        0
                               good
                    2
                                          Good
                                                    NaN
                                                           NaN
        1
                    1
                               good
                                          Good
                                                    NaN
                                                            NaN
                                                                    NaN
                          very good Very Good
                                                    NaN
                                                            NaN
                                                                    NaN
        3
                    1
                          very good
                                    Very Good
                                                    NaN
                                                            NaN
                                                                    NaN
        4
                    0
                                    Very Good
                          very good
                                                    NaN
                                                            NaN
                                                                    NaN
        475
                    2
                                                    NaN
                                                            NaN
                                                                    NaN
                               poor
                                          poor
        476
                    1
                               good
                                          Good
                                                    NaN
                                                            NaN
                                                                    NaN
        477
                    1
                          very good
                                                    NaN
                                                            NaN
                                                                    NaN
                                    Very Good
        478
                    1
                                                    NaN
                                                            NaN
                                                                    NaN
                               poor
                                          poor
                          very good Very Good
        479
                                                    NaN
                                                            NaN
                                                                    NaN
```

[480 rows x 17 columns]

```
In [174...

def assign_grade(DV):
    if 18 <= DV <= 20:
        return 'Very Good'
    elif 13 <= DV <= 14:
        return 'Average'
    elif 13 <= DV <= 17:
        return 'Good'
    else:
        return 'poor'

df['DV_Grade'] = df['PP'].apply(assign_grade)
    print(df)</pre>
```

```
S.NO SECTION DV
                        M2
                            PP
                                BEEE
                                      FL
                                           FIMS Total Percentage Grade
0
        1
            ALPHA
                    12
                        0
                            17
                                   9
                                       19
                                             15
                                                    72
                                                              60.00
                                                                       NaN
                                              3
                                                              70.00
1
        2
            ALPHA
                    19
                        12
                            16
                                   16
                                       18
                                                    84
                                                                       NaN
2
            ALPHA
                    18
                        14
                            18
                                  18
                                       18
                                             16
                                                    102
                                                              85.00
                                                                       NaN
3
            ALPHA
                    15
                         9
                            19
                                  17
                                       19
                                             15
                                                    94
                                                              78.33
                                                                       NaN
4
        5
            ALPHA
                   18
                        17
                            19
                                  19
                                       20
                                             18
                                                    111
                                                              92.50
                                                                       NaN
                                                              55.83
475
      476
            SIGMA
                    18
                         2
                            12
                                   3
                                       17
                                             15
                                                    67
                                                                       NaN
            SIGMA
476
      477
                    20
                         6
                            16
                                   11
                                       20
                                             14
                                                    87
                                                              72.50
                                                                       NaN
            SIGMA
477
      478
                    20
                         0
                            18
                                   13
                                       20
                                             18
                                                    89
                                                              74.17
                                                                       NaN
478
      479
            SIGMA
                    20
                        20
                             5
                                   19
                                                    96
                                       18
                                             14
                                                              80.00
                                                                       NaN
479
      480
            SIGMA
                    20
                        16
                            18
                                   19
                                       20
                                             19
                                                    112
                                                              93.33
                                                                       NaN
     backlogs Coding-skills
                               PP Grade
                                           DV Grade skills section
0
                                   Good
                                               Good
                                                        NaN
                        aood
1
            1
                        good
                                   Good
                                               Good
                                                        NaN
                                                                NaN
            0
                   very good
                              Very Good
                                          Very Good
                                                        NaN
                                                                NaN
3
                                                        NaN
                                                                NaN
            1
                  very good
                              Very Good
                                          Very Good
4
            0
                   very good
                              Very Good
                                          Very Good
                                                        NaN
                                                                NaN
475
            2
                                                        NaN
                                                                NaN
                        poor
                                    poor
                                               poor
476
            1
                        good
                                    Good
                                               Good
                                                        NaN
                                                                NaN
477
            1
                   very good
                                                                NaN
                              Very Good
                                          Very Good
                                                        NaN
478
                                                                NaN
            1
                        poor
                                    poor
                                               poor
                                                        NaN
479
            0
                   very good
                              Very Good
                                          Very Good
                                                        NaN
                                                                NaN
```

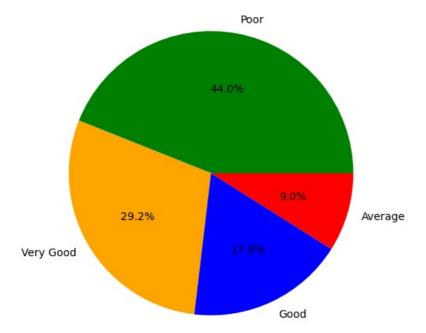
[480 rows x 17 columns]

subset = []

for index, row in df.iterrows():

```
In [179... def assign_grade(DV):
             if 18 <= DV <= 20:
                 return 'Very Good'
             elif 13 <= DV <= 14:
                 return 'Average'
             elif 15 <= DV <= 17:
                 return 'Good'
             else:
                 return 'Poor'
         df['DV_Grade'] = df['PP'].apply(assign_grade)
         grade_counts = df['DV_Grade'].value_counts()
         plt.figure(figsize=(6, 6))
         grade_counts.plot(kind='pie', autopct='%1.1f%%', colors=['green', 'orange', 'blue', 'red'])
         plt.title("Percentage Distribution of DV Grades")
         plt.ylabel("")
         plt.show()
```

Percentage Distribution of DV Grades



```
In [181... very good count = (df['PP'] == 'Very Good').sum()
         print(f"Number of 'Very Good': {very_good_count}")
        Number of 'Very Good': 0
         subjects = ['DV','M2', 'PP', 'BEEE', 'FL', 'FIMS']
In [183...
```

```
if any(row[subject] == 20 for subject in subjects):
                 subset.append(row)
         subset df = pd.DataFrame(subset)
         print(subset df)
             S.NO SECTION DV
                               M2 PP
                                        BEEE
                                             FL FIMS Total Percentage Grade \
                5
                    ALPHA 18
                               17
                                    19
                                              20
                                                                     92.50
                    ALPHA
        6
                7
                           15
                                          20
                                              15
                                                           94
                                                                     78.33
                                                                              NaN
                               10
                                    20
                                                    14
        7
                8
                    ALPHA
                           17
                                17
                                    19
                                          20
                                              19
                                                    13
                                                           105
                                                                     87.50
                                                                              NaN
                    ALPHA 10
                                                                     68.33
        8
                               18
                                              19
                                                                              NaN
                9
                                    0
                                          20
                                                    15
                                                           82
        9
               10
                    ALPHA 18
                               19
                                    20
                                          20
                                              20
                                                    15
                                                           112
                                                                     93.33
                                                                              NaN
        473
              474
                    SIGMA
                           20
                               20
                                    20
                                          20
                                              20
                                                    20
                                                          120
                                                                    100.00
                                                                              NaN
        476
              477
                    SIGMA
                           20
                                6
                                    16
                                          11
                                              20
                                                    14
                                                           87
                                                                     72.50
                                                                              NaN
        477
              478
                    SIGMA
                           20
                                0
                                    18
                                          13
                                             20
                                                    18
                                                           89
                                                                     74.17
                                                                              NaN
        478
                    SIGMA
                                                           96
              479
                           20
                               20
                                    5
                                          19
                                             18
                                                    14
                                                                     80.00
                                                                              NaN
        479
              480
                    SIGMA
                           20
                               16
                                   18
                                          19
                                              20
                                                    19
                                                           112
                                                                     93.33
                                                                              NaN
             backlogs Coding-skills
                                       PP Grade
                                                  DV_Grade skills
                                                                     section
        4
                                                                         NaN
                    0
                          very good
                                      Very Good
                                                 Very Good
                                                                NaN
        6
                    0
                          very good
                                      Very Good
                                                 Very Good
                                                                NaN
                                                                         NaN
        7
                    0
                          very good
                                      Very Good
                                                 Very Good
                                                                NaN
                                                                         NaN
        8
                    1
                                poor
                                           poor
                                                      Poor
                                                                NaN
                                                                         NaN
        9
                    0
                                                 Very Good
                                                                NaN
                                                                         NaN
                                      Very Good
                          very good
                                 . . .
                                            . . .
        473
                    0
                                                                NaN
                                                                         NaN
                                      Verv Good
                                                 Verv Good
                          very good
        476
                    1
                               good
                                           Good
                                                      Good
                                                                NaN
                                                                         NaN
                          very good
        477
                    1
                                      Very Good
                                                                NaN
                                                                         NaN
                                                 Verv Good
        478
                    1
                                poor
                                           poor
                                                      Poor
                                                                NaN
                                                                         NaN
        479
                    0
                                      Very Good
                                                 Very Good
                                                                NaN
                                                                         NaN
                          very good
        [185 rows x 17 columns]
In [184... df.info()
        <class 'pandas.core.frame.DataFrame'>
        RangeIndex: 480 entries, 0 to 479
        Data columns (total 17 columns):
                            Non-Null Count Dtype
         #
             Column
        - - -
             -----
                             -----
         0
             S.NO
                            480 non-null
                                             int64
         1
             SECTION
                            480 non-null
                                             object
         2
                            480 non-null
                                             int32
         3
             M2
                            480 non-null
                                             int32
         4
             PP
                            480 non-null
                                             int32
                            480 non-null
         5
             BFFF
                                             int32
                            480 non-null
         6
             FL
                                             int32
             FTMS
         7
                            480 non-null
                                             int32
         8
                            480 non-null
                                             int32
             Total
                            480 non-null
         9
             Percentage
                                             float64
         10
             Grade
                             0 non-null
                                             object
             backlogs
                             480 non-null
                                             int64
         11
         12
             Coding-skills 480 non-null
                                             object
             PP Grade
                            480 non-null
                                             object
         13
             DV Grade
                             480 non-null
                                             object
         14
         15 skills
                            0 non-null
                                             object
                             0 non-null
         16 section
                                             object
        dtypes: float64(1), int32(7), int64(2), object(7)
        memory usage: 50.8+ KB
         subjects = ['DV', 'M2', 'PP', 'BEEE', 'FL', 'FIMS']
In [185...
         subset = df[df[subjects].eq(20).any(axis=1)]
         print("Subset of students who scored 20 in any subject:")
         print(subset)
         for subject in subjects:
             count 20 = (df[subject] == 20).sum()
             print(f"Students who scored 20 in {subject}: {count 20}")
```

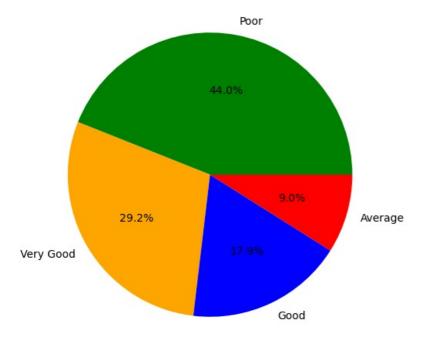
```
Subset of students who scored 20 in any subject:
             S.NO SECTION DV M2 PP
                                        BEEE FL FIMS Total Percentage Grade
        4
                    ALPHA
                            18
                                17
                                    19
                                          19
                                               20
                                                     18
                                                           111
                                                                      92.50
                                                                              NaN
        6
                     ALPHA
                            15
                                10
                                    20
                                           20
                                               15
                                                     14
                                                            94
                                                                      78.33
                                                                              NaN
        7
                    ALPHA
                            17
                                17
                                    19
                                           20
                                               19
                                                     13
                                                           105
                                                                      87.50
                                                                              NaN
                8
                    ALPHA
        8
                9
                            10
                                18
                                     0
                                           20
                                              19
                                                     15
                                                            82
                                                                      68.33
                                                                              NaN
        9
               10
                    ALPHA
                            18
                                19
                                    20
                                          20
                                               20
                                                     15
                                                           112
                                                                      93.33
                                                                              NaN
        473
              474
                     SIGMA
                                                                     100.00
                            20
                                20
                                    20
                                          20
                                               20
                                                     20
                                                           120
                                                                              NaN
                     SIGMA
        476
              477
                            20
                                 6
                                    16
                                           11
                                               20
                                                     14
                                                            87
                                                                      72.50
                                                                              NaN
        477
              478
                     SIGMA
                            20
                                 0
                                               20
                                                            89
                                                                      74.17
                                                                              NaN
                                    18
                                           13
                                                     18
                                                            96
        478
              479
                    SIGMA
                            20
                                20
                                     - 5
                                           19
                                               18
                                                     14
                                                                      80.00
                                                                              NaN
                    SIGMA
        479
              480
                            20
                                16
                                    18
                                           19
                                               20
                                                     19
                                                           112
                                                                      93.33
                                                                              NaN
                                                   DV Grade skills section
             backlogs Coding-skills
                                       PP Grade
        4
                                      Very Good
                                                  Very Good
                    0
                           very good
                                                               NaN
                                                                        NaN
        6
                     0
                           very good
                                      Very Good
                                                  Very Good
        7
                                                  Very Good
                    0
                                      Very Good
                                                               NaN
                                                                        NaN
                           very good
        8
                     1
                                poor
                                           poor
                                                       Poor
                                                               NaN
                                                                        NaN
        9
                    0
                           very good
                                      Very Good
                                                  Very Good
                                                               NaN
                                                                        NaN
                                 . . .
                    0
                                                               NaN
        473
                           very good
                                      Very Good
                                                  Very Good
                                                                        NaN
        476
                     1
                                                               NaN
                                                                        NaN
                                good
                                            Good
                                                       Good
                                                                        NaN
        477
                                                               NaN
                     1
                           very good
                                      Very Good
                                                  Very Good
        478
                                                               NaN
                                                                        NaN
                                poor
                                           poor
                                                       Poor
        479
                    0
                                                               NaN
                                                                        NaN
                                      Very Good
                                                  Very Good
                           very good
        [185 rows x 17 columns]
        Students who scored 20 in DV: 53
        Students who scored 20 in M2: 44
        Students who scored 20 in PP: 70
        Students who scored 20 in BEEE: 76
        Students who scored 20 in FL: 121
        Students who scored 20 in FIMS: 12
In [186... def assign_grade(DV):
             if 18 <= DV <= 20:
                  return 'Very Good'
             elif 13 <= DV <= 14:
                 return 'Average'
             elif 15 <= DV <= 17:
                 return 'Good'
             else:
                 return 'Poor'
         df['DV Grade'] = df['PP'].apply(assign grade)
         grade_counts = df['DV_Grade'].value_counts()
         plt.figure(figsize=(6, 6))
```

Percentage Distribution of DV Grades

plt.title("Percentage Distribution of DV Grades")

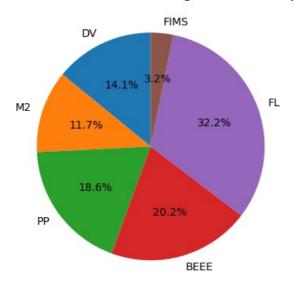
plt.ylabel("")
plt.show()

grade_counts.plot(kind='pie', autopct='%1.1f%%', colors=['green', 'orange', 'blue', 'red'])



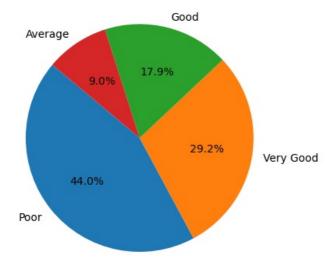
```
counts = [(df[subject] == 20).sum() for subject in subjects]
plt.pie(counts, labels=subjects, autopct='%1.1f%%', startangle=90)
plt.title('Distribution of Students Scoring 20 in Each Subject')
plt.show()
```

Distribution of Students Scoring 20 in Each Subject



```
df['skills'] = df['PP'].apply(assign_grade)
    skill_counts = df['skills'].value_counts()
    plt.pie(skill_counts, labels=skill_counts.index, autopct='%1.1f%%', startangle=140)
    plt.title('Skill Distribution')
    plt.show()
    df.skills.value_counts()
```

Skill Distribution



```
Out[193... skills
Poor 211
Very Good 140
Good 86
Average 43
Name: count, dtype: int64
```

In [195... df.describe()

	illean 2	.40.300000	14.000000	10.033730	12.000417	13.22003	10.00041	7 13.04300	75.704	303 00.470	010 1.001
	std 1	38.708327	4.644674	6.433664	5.874238	5.90435	1 4.27972	8 4.7161	15 24.723	878 20.603	304 1.501
	min	1.000000	0.000000	0.000000	0.000000	0.000000	0.00000	0.00000	0.000	0.000	0.000
	25 % 1	20.750000	12.000000	4.000000	9.000000	9.000000	13.00000	0 11.00000	00 64.000	0000 53.330	0.000
	50 % 2	240.500000	15.500000	10.000000	14.000000	15.000000	15.00000	0 15.00000	00 83.000	0000 69.170	000 1.000
	75% 3	860.250000	18.000000	16.000000	18.000000	18.000000	20.00000	0 17.00000	00 98.000	0000 81.670	000 2.000
	max 4	80.000000	20.000000	20.000000	20.000000	20.000000	20.00000	0 20.00000	00 120.000	100.000	000 6.000
197	df["sec	tion"] = "a	alpha"								
199	df[df["	SECTION"] =	== "ALPHA"]	.mean(nume	ric_only =T	rue)					
199	S.NO DV M2 PP BEEE FL FIMS Total Percent backlog dtype:	14 13 16 15 16 12 88 rage 74	500000 033333 733333 066667 616667 550000 850000 850000 941167 716667								
201	df.info										
201	0 1 2 3 4 475 4 476 4 477 4 478 4 479 4	method Data 1 ALPHA 2 ALPHA 3 ALPHA 4 ALPHA 5 ALPHA 6 SIGMA 677 SIGMA 677 SIGMA 678 SIGMA 679 SIGMA 680 SIGMA 60 Cklogs Cod 2 1 0 1 0 2 1 1 0	12 0 1 19 12 1 18 14 1 15 9 1 18 17 1 18 2 1 20 6 1 20 0 1 20 20 20 16 1	of S 7 9 1 6 16 1 8 18 1 9 17 1 9 19 2 2 3 1 6 11 2 8 13 2 5 19 1 8 19 2 PP_Grade Good Very Good	8 3 8 16 9 15 0 18 7 15 0 14 0 18 8 14 0 19 DV_Grad Good Very Good Very Good	72 84 102 94 111 67 87 89 96 112 de sk od od Very od Very od Very od Very od Very	60.00 70.00 85.00 78.33 92.50 55.83 72.50 74.17 80.00 93.33 ills section Good alpi Alpi Good alpi Good alpi Alpi Good alpi	ha ha ha ha ha ha ha ha	S Total	Percentage	e Grade \
	[480 rd	ows x 17 co	lumns]>								
203	df.grou	pby("SECTIO	N")[df.sel	ect_dtypes	(include=["number"]).columns]	.mean()			
203		S.NC	DV	M2	PP	BEEE	FL	FIMS	Total	Percentage	backlogs
	SECTION	1									
	ALPHA	30.500000	14.033333	13.733333	16.066667	15.616667	16.550000	12.850000	88.850000	74.041167	0.716667
	BETA	90.500000	12.083333	13.683333	15.666667	12.716667	15.833333	12.983333	82.966667	69.138500	1.150000
	DELTA	150.500000	13.483333	11.466667	15.016667	11.050000	15.916667	15.350000	82.283333	68.570000	1.216667
		L 014 01666		9.716667	12.750000		14.566667		77.183333	64.318833	1.416667
	EPSILON	1 214.010007	7 14.333333	3.7 10007							
						14.866667	15.716667	13.050000	76.583333	63 818833	1.550000
	GAMMA	270.500000	15.933333	7.616667	9.400000		15.716667		76.583333 75.133333	63.818833	1.550000
	GAMMA OMEGA	A 270.500000 A 369.833333	15.933333 14.600000	7.616667 8.000000	9.400000 10.216667	14.900000	15.350000	12.066667	75.133333	62.611000	1.716667
	GAMMA OMEGA SIGMA	270.500000	15.933333 14.600000 7 15.683168	7.616667 8.000000	9.400000 10.216667 12.534653	14.900000 13.504950	15.350000	12.066667 13.603960	75.133333 78.881188	62.611000 65.734257	

DV

S.NO

mean 240.500000 14.383333 10.093750

Out[195...

In [205... df.info()

PP

 count
 480.000000
 480.000000
 480.000000
 480.000000
 480.000000
 480.000000
 480.000000
 480.000000

M2

BEEE

12.885417 13.220833 15.535417 13.645833

FL

FIMS

Total Percentage

79.764583

480.000000

66.470313

backlogs 480.00000

1.38125

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 480 entries, 0 to 479
Data columns (total 17 columns):
# Column
                   Non-Null Count Dtype
- - -
     -----
                       -----
                    480 non-null
480 non-null
0
     S.NO
                                         int64
     SECTION
1
                                         object
                   480 non-null int32
 3 M2
 4
     PP
 5
    BEEE
 6 FL
7 FIMS 480 non-null int32
8 Total 480 non-null int32
9 Percentage 480 non-null floate
                                         float64
10 Grade 0 non-null
11 backlogs 480 non-null
                                         object
                                        int64
 12 Coding-skills 480 non-null
                                         object
13 PP_Grade 480 non-null 14 DV_Grade 480 non-null
                                         object
                                         object
                 480 non-null
 15 skills
                                          object
 16 section
                      480 non-null
                                          object
\texttt{dtypes: float64(1), int32(7), int64(2), object(7)}
memory usage: 50.8+ KB
```

```
In [207... from scipy.stats import ttest_ind
```

In [209... df[df['SECTION']=='BETA']['DV']

```
19
Out[209... 60
                   8
          62
                  12
          63
                  11
          64
                  12
          65
                   9
                  12
          66
          67
                  12
          68
                  16
          69
                  20
          70
                   4
                  17
          71
          72
          73
                  10
          74
                  17
          75
                   5
          76
                  17
          77
                  13
          78
                  19
          79
                  19
          80
                  19
          81
                  18
          82
                   2
          83
                  10
          84
                  12
          85
                   3
          86
                  17
          87
                  13
          88
                   2
          89
                  10
          90
                  17
          91
                  14
          92
                  11
          93
                  14
          94
                  12
          95
                  16
          96
                   8
          97
                   8
          98
                   6
          99
                   9
          100
                  10
          101
                  13
          102
                  10
          103
                  11
          104
                  17
          105
                  12
          106
          107
                  11
          108
                  10
          109
                  13
          110
                   8
          111
                  10
          112
                  16
          113
                  15
          114
                  11
          115
                  20
          116
                  13
          117
                  12
          118
                   9
                  15
          119
          Name: DV, dtype: int32
```

In [211... from scipy.stats import ttest_ind
 df[df['SECTION'] == 'ALPHA']['DV']

```
Out[211... 0
              12
              19
        2
              18
              15
        4
              18
        5
              17
        6
7
              15
              17
        8
              10
        9
              18
        10
              17
              20
        11
        12
              16
        13
              17
        14
             19
        15
             13
        16
              15
        17
              11
        18
              14
        19
              19
        20
              4
        21
              14
        22
              17
        23
              20
        24
              15
        25
              6
        26
              17
              5
        27
             19
        28
        29
              8
        30
              11
        31
              12
        32
              17
        33
              14
        34
              17
        35
              8
        36
              11
        37
              15
        38
              19
        39
              20
        40
              18
        41
              16
        42
              16
        43
              11
        44
              18
        45
              11
        46
              14
        47
              16
        48
              16
        49
              15
        50
              1
        51
              6
        52
             17
        53
              8
        54
             14
        55
              15
        56
              10
        57
              2
             10
        58
        59
              19
        Name: DV, dtype: int32
In [213... df[df['SECTION'] == 'BETA']['DV']
```

```
19
Out[213...
          60
          61
                 12
          62
          63
                  11
                  12
          64
          65
                  12
          66
          67
                  12
          68
                 16
          69
                  20
          70
          71
                  17
          72
          73
                  10
          74
                  17
          75
                  5
          76
                  17
          77
                  13
          78
                 19
          79
                  19
          80
                  19
          81
                  18
          82
                  2
          83
                  10
          84
                  12
          85
                  3
          86
                  17
          87
                  13
          88
                  2
          89
                  10
          90
                  17
          91
                  14
          92
                  11
          93
                  14
          94
                  12
          95
                  16
          96
                  8
          97
                  8
          98
                  6
          99
                  9
          100
                  10
          101
                  13
          102
                  10
          103
                  11
          104
                  17
          105
                  12
          106
          107
                 11
          108
                  10
          109
                 13
          110
          111
                 10
          112
                  16
                 15
          113
          114
                 20
          115
          116
                  13
          117
                 12
          118
                 15
          119
          Name: DV, dtype: int32
In [215... ttest_ind(df[df['SECTION'] == 'ALPHA']['DV'] , df[df['SECTION'] == 'BETA']['DV'])
Out[215... TtestResult(statistic=2.3418185924318102, pvalue=0.020866453244001094, df=118.0)
In [217... from scipy.stats import ttest_rel
          ttest_rel(df[df['SECTION'] == 'ALPHA']['DV'] , df[df['SECTION'] == 'BETA']['DV'])
Out[217... TtestResult(statistic=2.3172456109384103, pvalue=0.023979527821469917, df=59)
In [219... ALPHA DV = df[df["SECTION"] == "ALPHA"]['DV'].dropna()
          BETA_DV = df[df["SECTION"] == "BETA"]['DV'].dropna()
          ttest_ind(ALPHA_DV,BETA_DV)
{\tt Out[219...\ TtestResult(statistic=2.3418185924318102,\ pvalue=0.020866453244001094,\ df=118.0)}
In [230... from scipy.stats import chi2_contingency
In [240... df.DV.mean()
Out[240... 14.3833333333333333
```

```
In [242_ df[df['SECTION']=='ALPHA'].DV.mean()
Out[242... 14.0333333333333333
In [244... import scipy.stats as stats
In [246... t_statistics, p_value = stats.ttest_1samp(df[df['SECTION'] == 'BETA']['PP'], popmean=14.41)
         print(t_statistics, p_value)
        1.8778523020441942 0.06534654049350333
In [248... t_statistics, p_value = stats.ttest_1samp(df[df['SECTION'] == 'BETA']['DV'], popmean=14.41)
         print(t_statistics, p_value)
        -4.035751834264198 0.0001588940914138618
In [250... t_statistics, p_value = stats.ttest_1samp(df[df['SECTION'] == 'ALPHA']['DV'] ,df.DV.mean())
        print(t_statistics, p_value)
        -0.5825263515793191 0.5624319157350715
In [252... t_statistics, p_value = stats.ttest_1samp(df[df['SECTION'] == 'GAMMA']['DV'] ,df.DV.mean())
        print(t_statistics, p_value)
        5.436735948684493 1.087970538399695e-06
In [254... t_statistics, p_value = stats.ttest_lsamp(df[df['SECTION'] == 'DELTA']['DV'] ,df.DV.mean())
         print(t_statistics, p_value)
        -1.6332146803454848 0.10774976960815406
In [256... t_statistics, p_value = stats.ttest_lsamp(df[df['SECTION'] == 'SIGMA']['DV'] ,df.DV.mean())
        print(t_statistics, p_value)
        2.6489850039194636 0.009384060119324023
In [258... t_statistics, p_value = stats.ttest_1samp(df[df['SECTION'] == 'EPSILON']['DV'] ,df.DV.mean())
        print(t statistics, p value)
        -0.09486832980504935 0.9247408819314669
In [260... sample alpha = df[df["SECTION"] == "ALPHA"]["DV"]
         sample beta = df[df["SECTION"] == "BETA"]["DV"]
         t_statistic, p_value = stats.ttest_ind(sample_alpha, sample_beta)
         print("T-statistic:", t_statistic)
         print("P-value:", p_value)
        T-statistic: 2.3418185924318102
        P-value: 0.020866453244001094
In [262... from scipy.stats import chi2_contingency
In [264... data = [df[df["SECTION"] == "ALPHA"]['DV'],df[df["SECTION"] == "BETA"]['DV']]
         stat, p, dof, expected = chi2_contingency(data)
         alpha = 0.05
         print("p value is " + str(p))
         if p <= alpha:</pre>
             print('Dependent (reject H0)')
         else:
             print('Independent (H0 holds true)')
        p value is 2.3496708155645757e-05
        Dependent (reject H0)
```

DATASET OBSERVATION

The S.NO column has missing values, which might indicate improper data entry.

The SECTION column has some missing values, but it mostly contains section labels (e.g., ALPHA).

Marks columns (DV, M-II, PP, BEEE, FL, FIMS) are stored as objects instead of numerical values, suggesting potential formatting issues (e.g., extra spaces or non-numeric entries).

Most marks columns have minor missing values (only 1-3 missing entries per column).

The dataset likely contains students' marks in multiple subjects, with scores ranging from 0 to 20.

In []:			
In []:			
Loading [MathJax]/extensions/Safe.js		