

```
In [1]: # importing libraries needed for web scraping and then to store the collected
# data into an excel file

import requests # to access the website/webpage
from bs4 import BeautifulSoup # to parse the HTML source code of the webpage
import openpyxl # to save the collected raw data into an excel file
import pandas as pd # for data manipulation and data analysis
import numpy as np # for data manipulation and performing numerical operations on da
import re # for string manipulation using regular expressions
```

```
In [2]: excel = openpyxl.Workbook() # creating an excel file
#excel.sheetnames # sheets present in the excel file created
sheet = excel.active # to make the relevant sheet active for loading data
sheet.title = 'HP 15s AMD Ryzen 3 reviews' #renaming the sheet
sheet.append(['Laptop Variant', 'Reviewed Date', 'Reviewer Name', 'Rating', 'Review
# appending column names into the sheet
```

```
In [ ]: review_urls = ['https://www.amazon.in/HP-Micro-Edge-Anti-Glare-Graphics-15s-eq2143au
                        'https://www.amazon.in/HP-Micro-Edge-Anti-Glare-Graphics-15s-eq2143au
                        ]

try:
    for url in review_urls:
        source = requests.get(url)
        # to generate a response object which is stored in 'source' variable
        # this contains some components of the webpage along with its HTML code

        source.raise_for_status() # to capture/throw an error if the webpage we
                                # are trying to access has any issue

        parsed_html_code = BeautifulSoup(source.text, 'html.parser')
        # to capture the HTML code(.text), parsing it and then storing it in
        # the variable

        # finding and parsing HTML tags and their corresponding class to extract
        # the required data

        reviews = parsed_html_code.find('div', class_ = "a-section a-spacing-none re
        # each div tag with its corresponding class = "a-section review aok-relative" co

        for review in reviews:

            reviewer_name = review.find('a', class_ = "a-profile-content").text

            rating = review.find('a', class_ = "a-link-normal").text.split('.')[0]

            review_title = review.find('a', class_ = "a-size-base a-link-normal revi

            reviewed_date = review.find('span', class_ = "a-size-base a-color-second

            laptop_variant = review.find('div', class_ = "a-row a-spacing-mini revie

            review_text = review.find('span', class_ = "a-size-base review-text revi

            sheet.append([laptop_variant, reviewed_date, reviewer_name, rating, revi

except Exception as e:
    print(e)
```

```
excel.save('HP 15s AMD Ryzen 3 reviews.xlsx')
```

```
In [7]: hp_15s_reviews = pd.read_excel('HP 15s AMD Ryzen 3 reviews.xlsx')
```

```
In [ ]:
```

## Basic Data Cleaning

```
In [9]: hp_15s_reviews.dtypes
```

```
Out[9]: Laptop Variant      object
Reviewed Date      object
Reviewer Name      object
Rating              int64
Review Title       object
Review Text        object
dtype: object
```

```
In [66]: hp_15s_reviews['Reviewed Date'] = pd.to_datetime(hp_15s_reviews['Reviewed Date'])
```

```
In [67]: type(hp_15s_reviews['Reviewed Date'][3])
```

```
Out[67]: pandas._libs.tslibs.timestamps.Timestamp
```

```
In [68]: hp_15s_reviews.dtypes
```

```
Out[68]: Laptop Variant      object
Reviewed Date      datetime64[ns]
Reviewer Name      object
Rating              int64
Review Title       object
Review Text        object
dtype: object
```

```
In [69]: hp_15s_reviews
```

```
Out[69]:
```

	Laptop Variant	Reviewed Date	Reviewer Name	Rating	Review Title	Review Text
0	1TB HDD + 256GB SSD	2021-06-07	Amazon Customer	5	\nBest Laptop under 40k\n	\nThis laptop is perfect for home and student ...
1	1TB HDD + 256GB SSD	2021-02-10	Shubhankar	5	\nRyzen 3 3250U much better than core i3 10t...	\nOne of the best product at this price....\n
2	1TB HDD + 256GB SSD	2021-02-07	karthik.v	4	\nAll in all\n	\nVery good .... After use of 9 months (update...
3	1TB HDD + 256GB SSD	2021-05-15	Kushal Mukherjee	5	\nHighly recommended. Go for it.\n	\nBest laptop under 40k. 1TB HDD, 256GB SSD, 8...
4	1TB HDD + 256GB SSD	2021-02-07	Yaswanth	5	\nGood\n	\n\n\n\n\n The media could ...
5	1TB HDD + 256GB SSD	2021-06-17	Sunita	1	\nPoor laptop for 41K - freezes with MS Teams\n	\nl bought this laptop for remote schooling of...

	Laptop Variant	Reviewed Date	Reviewer Name	Rating	Review Title	Review Text
6	1TB HDD + 256GB SSD	2021-06-18	Amazon Customer	1	\nDoes not work with microsoft teams app. it f...	\nl don't know how I missed the review given b...
7	1TB HDD + 256GB SSD	2021-05-02	Jai R. Curchorcar	1	\nUnsure of the Configuration\n	\nThis laptop is overall a really good package...
8	1TB HDD + 256GB SSD	2021-04-22	Kintu Solanki	1	\nWorst ram\n	\nl would suggest not to buy this laptop it ha...
9	1TB HDD + 256GB SSD	2021-06-29	Rishabh sinha	1	\n8 gb ram and 256 ssd still laptop and its ta...	\n\n\n\n\n The media could ...
10	1TB HDD + 256GB SSD	2021-03-25	Kamraan Javaid	5	\nBest laptop\n	\nBest laptop..Display in awesome...Build qual...
11	1TB HDD + 256GB SSD	2021-06-29	Dinesh	1	\nMS Teams hangs when camera is ON\n	\nMS Teams hangs when the camera is switched o...
12	1TB HDD + 256GB SSD	2021-07-17	Vandana Kapoor	1	\nDamaged product received and Amazon not pick...	\nReceived damaged laptop and it has been two ...
13	1TB HDD + 256GB SSD	2021-07-23	NIRMAL JHA	1	\nBoth USB Ports can't be used at once. Disapp...	\nLaptop has only 2 USB PORTS that too much cl...
14	1TB HDD + 256GB SSD	2021-04-27	KUNAL JOSHI	2	\nDont buy this Processor, this hangs a lot\n	\nRepeatedly this Hangs. Processor is very bad...
15	1TB HDD + 256GB SSD	2021-06-01	A literature student	5	\nAn amazing laptop for students!\n	\nThe product is really good for its price.Pro...
16	1TB HDD + 256GB SSD	2021-06-21	Kamna Sharma	1	\nNot a good product\n	\nPurchased 1 month back. Cons below:Hangs whi...
17	1TB HDD + 256GB SSD	2021-07-02	Supria	1	\nNot gud with Microsoft teams\n	\nl bought this laptop for remote schooling of...
18	1TB HDD + 256GB SSD	2021-05-29	ARJUN	1	\nCheap Quality cheap material cheap Sounds,Pl...	\nDoesn't reach expectationsGo for i3 Processor ...
19	1TB HDD + 256GB SSD	2021-07-09	AZIZ	1	\nWarranty not proper\n	\nDear Team HPI purchased this laptop on 3rd J...

```
In [70]: hp_15s_reviews["Review Title"]
```

```
Out[70]: 0          \nBest Laptop under 40k\n
1      \nRyzen 3 3250U much better than core i3 10t...
2          \nAll in all\n
3      \nHighly recommended. Go for it.\n
4          \nGood\n
5      \nPoor laptop for 41K - freezes with MS Teams\n
6      \nDoes not work with microsoft teams app. it f...
7          \nUnsure of the Configuration\n
8          \nWorst ram\n
9      \n8 gb ram and 256 ssd still laptop and its ta...
10         \nBest laptop\n
11         \nMS Teams hangs when camera is ON\n
12      \nDamaged product received and Amazon not pick...
```

```

13     \nBoth USB Ports can't be used at once. Disapp...
14         \nDont buy this Processor, this hangs a lot\n
15             \nAn amazing laptop for students!\n
16                 \nNot a good product\n
17                     \nNot gud with Microsoft teams\n
18     \nCheap Quality cheap material cheap Sounds,Pl...
19         \nWarranty not proper\n
Name: Review Title, dtype: object

```

```
In [71]: hp_15s_reviews["Review Title"][1]
```

```
Out[71]: '\nRyzen 3 3250U much better than core i3 10th generation\n'
```

```
In [72]: hp_15s_reviews["Review Title"]
```

```

Out[72]: 0             \nBest Laptop under 40k\n
1     \nRyzen 3 3250U much better than core i3 10t...
2             \nAll in all\n
3             \nHighly recommended. Go for it.\n
4                 \nGood\n
5     \nPoor laptop for 41K - freezes with MS Teams\n
6     \nDoes not work with microsoft teams app. it f...
7             \nUnsure of the Configuration\n
8                 \nWorst ram\n
9     \n8 gb ram and 256 ssd still laptop and itssta...
10             \nBest laptop\n
11             \nMS Teams hangs when camera is ON\n
12     \nDamaged product received and Amazon not pick...
13     \nBoth USB Ports can't be used at once. Disapp...
14         \nDont buy this Processor, this hangs a lot\n
15             \nAn amazing laptop for students!\n
16                 \nNot a good product\n
17                     \nNot gud with Microsoft teams\n
18     \nCheap Quality cheap material cheap Sounds,Pl...
19         \nWarranty not proper\n
Name: Review Title, dtype: object

```

```
In [73]: hp_15s_reviews["Review Title"] = hp_15s_reviews["Review Title"].str.replace('\n', '')
```

```
In [74]: hp_15s_reviews["Review Title"]
```

```

Out[74]: 0             Best Laptop under 40k
1     Ryzen 3 3250U much better than core i3 10th ...
2             All in all
3             Highly recommended. Go for it.
4                 Good
5     Poor laptop for 41K - freezes with MS Teams
6     Does not work with microsoft teams app. it fre...
7             Unsure of the Configuration
8                 Worst ram
9     8 gb ram and 256 ssd still laptop and its task...
10             Best laptop
11             MS Teams hangs when camera is ON
12     Damaged product received and Amazon not pickin...
13     Both USB Ports can't be used at once. Disappoi...
14         Dont buy this Processor, this hangs a lot
15             An amazing laptop for students!
16                 Not a good product
17                     Not gud with Microsoft teams
18     Cheap Quality cheap material cheap Sounds,Plea...
19         Warranty not proper
Name: Review Title, dtype: object

```

```
In [75]: hp_15s_reviews["Review Title"][1]
```

```
Out[75]: 'Ryzen 3 3250U much better than core i3 10th generation'
```

```
In [76]: hp_15s_reviews["Review Text"]
```

```
Out[76]: 0      \nThis laptop is perfect for home and student ...
1          \nOne of the best product at this price....\n
2      \nVery good .... After use of 9 months (update...
3      \nBest laptop under 40k. 1TB HDD, 256GB SSD, 8...
4      \n\n\n\n\n          The media could ...
5      \nI bought this laptop for remote schooling of...
6      \nI don't know how I missed the review given b...
7      \nThis laptop is overall a really good package...
8      \nI would suggest not to buy this laptop it ha...
9      \n\n\n\n\n          The media could ...
10     \nBest laptop..Display in awesome...Build qual...
11     \nMS Teams hangs when the camera is switched o...
12     \nReceived damaged laptop and it has been two ...
13     \nLaptop has only 2 USB PORTS that too much cl...
14     \nRepeatedly this Hangs. Processor is very bad...
15     \nThe product is really good for its price.Pro...
16     \nPurchased 1 month back. Cons below:Hangs whi...
17     \nI bought this laptop for remote schooling of...
18     \nDoesn't reach expectationsGo for i3 Processor ...
19     \nDear Team HPI purchased this laptop on 3rd J...
Name: Review Text, dtype: object
```

```
In [77]: hp_15s_reviews["Review Text"][1]
```

```
Out[77]: '\nOne of the best product at this price....\n'
```

```
In [78]: hp_15s_reviews["Review Text"][2]
```

```
Out[78]: '\nVery good .... After use of 9 months (updated)\n'
```

```
In [79]: hp_15s_reviews["Review Text"][3]
```

```
Out[79]: '\nBest laptop under 40k. 1TB HDD, 256GB SSD, 8GB RAM, Ryzen 3.No matter how much di
g in you wont find these specifications in any other brand at this price.\n'
```

```
In [80]: hp_15s_reviews["Review Text"] = hp_15s_reviews["Review Text"].str.replace('\n\n', '')
```

```
In [81]: len(hp_15s_reviews)
```

```
Out[81]: 20
```

```
In [82]: for i in range(len(hp_15s_reviews)):
          hp_15s_reviews["Review Text"][i] = hp_15s_reviews["Review Text"][i].strip(' ')
```

<ipython-input-82-b35aa6a22037>:2: SettingWithCopyWarning:  
A value is trying to be set on a copy of a slice from a DataFrame

See the caveats in the documentation: [https://pandas.pydata.org/pandas-docs/stable/user\\_guide/indexing.html#returning-a-view-versus-a-copy](https://pandas.pydata.org/pandas-docs/stable/user_guide/indexing.html#returning-a-view-versus-a-copy)  
hp\_15s\_reviews["Review Text"][i] = hp\_15s\_reviews["Review Text"][i].strip(' ')

```
In [83]: hp_15s_reviews["Review Text"][1]
```

```
Out[83]: '\nOne of the best product at this price....\n'
```

```
In [84]: hp_15s_reviews["Review Text"][2]
```

```
Out[84]: '\nVery good .... After use of 9 months (updated)\n'
```

```
In [85]: hp_15s_reviews["Review Text"]
```

```
Out[85]: 0      \nThis laptop is perfect for home and student ...
1          \nOne of the best product at this price....\n
2      \nVery good .... After use of 9 months (update...
3      \nBest laptop under 40k. 1TB HDD, 256GB SSD, 8...
4          \n          The media could not be l...
5      \nI bought this laptop for remote schooling of...
6      \nI don't know how I missed the review given b...
7      \nThis laptop is overall a really good package...
8      \nI would suggest not to buy this laptop it ha...
9          \n          The media could not be l...
10     \nBest laptop..Display in awesome...Build qual...
11     \nMS Teams hangs when the camera is switched o...
12     \nReceived damaged laptop and it has been two ...
13     \nLaptop has only 2 USB PORTS that too much cl...
14     \nRepeatedly this Hangs. Processor is very bad...
15     \nThe product is really good for its price.Pro...
16     \nPurchased 1 month back. Cons below:Hangs whi...
17     \nI bought this laptop for remote schooling of...
18     \nDoesn't reach expectationsGo for i3 Processor ...
19     \nDear Team HPI purchased this laptop on 3rd J...
Name: Review Text, dtype: object
```

```
In [86]: hp_15s_reviews["Review Text"][4] = hp_15s_reviews["Review Text"][4].replace('\n', ''
```

<ipython-input-86-32c1384e0049>:1: SettingWithCopyWarning:  
A value is trying to be set on a copy of a slice from a DataFrame

See the caveats in the documentation: [https://pandas.pydata.org/pandas-docs/stable/user\\_guide/indexing.html#returning-a-view-versus-a-copy](https://pandas.pydata.org/pandas-docs/stable/user_guide/indexing.html#returning-a-view-versus-a-copy)

```
hp_15s_reviews["Review Text"][4] = hp_15s_reviews["Review Text"][4].replace('\n',
''.replace('The media could not be loaded.', '').strip(' ').replace('\xa0', ''))
```

```
In [87]: hp_15s_reviews["Review Text"][4]
```

```
Out[87]: 'Super quality and display is awesome'
```

```
In [88]: hp_15s_reviews["Review Text"]
```

```
Out[88]: 0      \nThis laptop is perfect for home and student ...
1          \nOne of the best product at this price....\n
2      \nVery good .... After use of 9 months (update...
3      \nBest laptop under 40k. 1TB HDD, 256GB SSD, 8...
4          \n          Super quality and display is awesome
5      \nI bought this laptop for remote schooling of...
6      \nI don't know how I missed the review given b...
7      \nThis laptop is overall a really good package...
8      \nI would suggest not to buy this laptop it ha...
9          \n          The media could not be l...
10     \nBest laptop..Display in awesome...Build qual...
11     \nMS Teams hangs when the camera is switched o...
```

```

12 \nReceived damaged laptop and it has been two ...
13 \nLaptop has only 2 USB PORTS that too much cl...
14 \nRepeatedly this Hangs. Processor is very bad...
15 \nThe product is really good for its price.Pro...
16 \nPurchased 1 month back. Cons below:Hangs whi...
17 \nI bought this laptop for remote schooling of...
18 \nDoesn't reach expectationsGo for i3 Processor ...
19 \nDear Team HPI purchased this laptop on 3rd J...
Name: Review Text, dtype: object

```

```
In [89]: hp_15s_reviews["Review Text"][4]
```

```
Out[89]: 'Super quality and display is awesome'
```

```
In [90]: hp_15s_reviews["Review Text"] = hp_15s_reviews["Review Text"].str.replace('\n', '').
```

```
<ipython-input-90-76ac54bae1c0>:1: FutureWarning: The default value of regex will change from True to False in a future version.
```

```

    hp_15s_reviews["Review Text"] = hp_15s_reviews["Review Text"].str.replace('\n',
    '').str.replace('The media could not be loaded.', '').str.strip(' ').str.replace('\xa0', '')

```

```
In [91]: hp_15s_reviews["Review Text"]
```

```

Out[91]: 0    This laptop is perfect for home and student us...
        1          One of the best product at this price....
        2    Very good .... After use of 9 months (updated)
        3    Best laptop under 40k. 1TB HDD, 256GB SSD, 8GB...
        4          Super quality and display is awesome
        5    I bought this laptop for remote schooling of k...
        6    I don't know how I missed the review given by ...
        7    This laptop is overall a really good package, ...
        8    I would suggest not to buy this laptop it has ...
        9    Laptop is having 256 ssd and 8 gb ram still ha...
       10    Best laptop..Display in awesome...Build qualit...
       11    MS Teams hangs when the camera is switched on...
       12    Received damaged laptop and it has been two we...
       13    Laptop has only 2 USB PORTS that too much clos...
       14    Repeatedly this Hangs. Processor is very bad. ...
       15    The product is really good for its price.Pros:...
       16    Purchased 1 month back. Cons below:Hangs while...
       17    I bought this laptop for remote schooling of k...
       18    Doesn't reach expectationsGo for i3 Processor on...
       19    Dear Team HPI purchased this laptop on 3rd Jul...
Name: Review Text, dtype: object

```

```
In [92]: hp_15s_reviews["Review Text"][4]
```

```
Out[92]: 'Super quality and display is awesome'
```

```
In [93]: hp_15s_reviews["Review Text"][9]
```

```

Out[93]: 'Laptop is having 256 ssd and 8 gb ram still hangs while opening simple application
and browsers. On top of that task manager also crashes. Only a hard reboot then fix
es the issue. Attaching video poof of booting time. Disappointing.'

```

```
In [94]: hp_15s_reviews["Review Text"].str.lower()
```

```

Out[94]: 0    this laptop is perfect for home and student us...
        1          one of the best product at this price....

```

```

2         very good .... after use of 9 months (updated)
3     best laptop under 40k. 1tb hdd, 256gb ssd, 8gb...
4         super quality and display is awesome
5     i bought this laptop for remote schooling of k...
6     i don't know how i missed the review given by ...
7     this laptop is overall a really good package, ...
8     i would suggest not to buy this laptop it has ...
9     laptop is having 256 ssd and 8 gb ram still ha...
10    best laptop..display in awesome...build qualit...
11    ms teams hangs when the camera is switched on....
12    received damaged laptop and it has been two we...
13    laptop has only 2 usb ports that too much clos...
14    repeatedly this hangs. processor is very bad. ...
15    the product is really good for its price.pros:...
16    purchased 1 month back. cons below:hangs while...
17    i bought this laptop for remote schooling of k...
18    doesn't reach expectationsgo for i3 processor on...
19    dear team hpi purchased this laptop on 3rd jul...
Name: Review Text, dtype: object

```

```
In [95]: hp_15s_reviews["Review Text"] = hp_15s_reviews["Review Text"].str.lower()
```

```
In [96]: hp_15s_reviews["Review Text"]
```

```

Out[96]: 0     this laptop is perfect for home and studentus...
1         one of the best product at this price....
2         very good .... after use of 9 months (updated)
3     best laptop under 40k. 1tb hdd, 256gb ssd, 8gb...
4         super quality and display is awesome
5     i bought this laptop for remote schooling of k...
6     i don't know how i missed the review given by ...
7     this laptop is overall a really good package, ...
8     i would suggest not to buy this laptop it has ...
9     laptop is having 256 ssd and 8 gb ram still ha...
10    best laptop..display in awesome...build qualit...
11    ms teams hangs when the camera is switched on....
12    received damaged laptop and it has been two we...
13    laptop has only 2 usb ports that too much clos...
14    repeatedly this hangs. processor is very bad. ...
15    the product is really good for its price.pros:...
16    purchased 1 month back. cons below:hangs while...
17    i bought this laptop for remote schooling of k...
18    doesn't reach expectationsgo for i3 processor on...
19    dear team hpi purchased this laptop on 3rd jul...
Name: Review Text, dtype: object

```

```
In [97]: hp_15s_reviews["Review Text"][9]
```

```

Out[97]: 'laptop is having 256 ssd and 8 gb ram still hangs while opening simple application
and browsers. on top of that task manager also crashes. only a hard reboot then fix
es the issue. attaching video poof of booting time. disappointing.'

```

```
In [98]: hp_15s_reviews
```

```

Out[98]:

```

	Laptop Variant	Reviewed Date	Reviewer Name	Rating	Review Title	Review Text
0	1TB HDD + 256GB SSD	2021-06-07	Amazon Customer	5	Best Laptop under 40k	this laptop is perfect for home and student us...
1	1TB HDD + 256GB SSD	2021-02-10	Shubhankar	5	Ryzen 3 3250U much better than core i3 10th ...	one of the best product at this price....



	Laptop Variant	Reviewed Date	Reviewer Name	Rating	Review Title	Review Text
2	1TB HDD + 256GB SSD	2021-02-07	karthik.v	4	All in all	very good .... after use of 9 months (updated)
3	1TB HDD + 256GB SSD	2021-05-15	Kushal Mukherjee	5	Highly recommended. Go for it.	best laptop under 40k. 1tb hdd, 256gb ssd, 8gb...
4	1TB HDD + 256GB SSD	2021-02-07	Yaswanth	5	Good	super quality and display is awesome
5	1TB HDD + 256GB SSD	2021-06-17	Sunita	1	Poor laptop for 41K - freezes with MS Teams	i bought this laptop for remote schooling of k...
6	1TB HDD + 256GB SSD	2021-06-18	Amazon Customer	1	Does not work with microsoft teams app. it fre...	i don't know how i missed the review given by ...
7	1TB HDD + 256GB SSD	2021-05-02	Jai R. Curchorcar	1	Unsure of the Configuration	this laptop is overall a really good package, ...
8	1TB HDD + 256GB SSD	2021-04-22	Kintu Solanki	1	Worst ram	i would suggest not to buy this laptop it has ...
9	1TB HDD + 256GB SSD	2021-06-29	Rishabh sinha	1	8 gb ram and 256 ssd still laptop and its task...	laptop is having 256 ssd and 8 gb ram still ha...
10	1TB HDD + 256GB SSD	2021-03-25	Kamraan Javaid	5	Best laptop	best laptop..display in awesome...build qualit...
11	1TB HDD + 256GB SSD	2021-06-29	Dinesh	1	MS Teams hangs when camera is ON	ms teams hangs when the camera is switched on....
12	1TB HDD + 256GB SSD	2021-07-17	Vandana Kapoor	1	Damaged product received and Amazon not pickin...	received damaged laptop and it has been two we...
13	1TB HDD + 256GB SSD	2021-07-23	NIRMAL JHA	1	Both USB Ports can't be used at once. Disappoi...	laptop has only 2 usb ports that too much clos...
14	1TB HDD + 256GB SSD	2021-04-27	KUNAL JOSHI	2	Dont buy this Processor, this hangs a lot	repeatedly this hangs. processor is very bad. ...
15	1TB HDD + 256GB SSD	2021-06-01	A literature student	5	An amazing laptop for students!	the product is really good for its price.pros:...
16	1TB HDD + 256GB SSD	2021-06-21	Kamna Sharma	1	Not a good product	purchased 1 month back. cons below:hangs while...
17	1TB HDD + 256GB SSD	2021-07-02	Supria	1	Not gud with Microsoft teams	i bought this laptop for remote schooling of k...
18	1TB HDD + 256GB SSD	2021-05-29	ARJUN	1	Cheap Quality cheap material cheap Sounds,Plea...	doesn't reach expectationsgo for i3 processor on...
19	1TB HDD + 256GB SSD	2021-07-09	AZIZ	1	Warranty not proper	dear team hpi purchased this laptop on 3rd jul...

In [99]:

hp\_15s\_reviews.dtypes

Out[99]: Laptop Variant                      object  
Reviewed Date                      datetime64[ns]

```

Reviewer Name      object
Rating             int64
Review Title       object
Review Text        object
dtype: object

```

In [100...

```

hp_15s_reviews['Laptop Variant'] = hp_15s_reviews['Laptop Variant'].str.replace('+',
hp_15s_reviews['Laptop Variant']

```

<ipython-input-100-8f59460cdad7>:1: FutureWarning: The default value of regex will change from True to False in a future version. In addition, single character regular expressions will\*not\* be treated as literal strings when regex=True.

```

hp_15s_reviews['Laptop Variant'] = hp_15s_reviews['Laptop Variant'].str.replace
('+', '')

```

Out[100...

```

0      1TB HDD  256GB SSD
1      1TB HDD  256GB SSD
2      1TB HDD  256GB SSD
3      1TB HDD  256GB SSD
4      1TB HDD  256GB SSD
5      1TB HDD  256GB SSD
6      1TB HDD  256GB SSD
7      1TB HDD  256GB SSD
8      1TB HDD  256GB SSD
9      1TB HDD  256GB SSD
10     1TB HDD  256GB SSD
11     1TB HDD  256GB SSD
12     1TB HDD  256GB SSD
13     1TB HDD  256GB SSD
14     1TB HDD  256GB SSD
15     1TB HDD  256GB SSD
16     1TB HDD  256GB SSD
17     1TB HDD  256GB SSD
18     1TB HDD  256GB SSD
19     1TB HDD  256GB SSD

```

Name: Laptop Variant, dtype: object

In [101...

```

hp_15s_reviews["Review Text"] = hp_15s_reviews["Review Text"].str.replace('.', '')
hp_15s_reviews["Review Text"]

```

<ipython-input-101-4c78c2ec4b94>:1: FutureWarning: The default value of regex will change from True to False in a future version. In addition, single character regular expressions will\*not\* be treated as literal strings when regex=True.

```

hp_15s_reviews["Review Text"] = hp_15s_reviews["Review Text"].str.replace('.', '')

```

Out[101...

```

0      this laptop is perfect for home and student us...
1              one of the best product at this price
2              very good  after use of 9 months (updated)
3      best laptop under 40k 1tb hdd, 256gb ssd, 8gb ...
4              super quality and display is awesome
5      i bought this laptop for remote schooling of k...
6      i don't know how i missed the review given by ...
7      this laptop is overall a really good package, ...
8      i would suggest not to buy this laptop it has ...
9      laptop is having 256 ssd and 8 gb ram still ha...
10     best laptopdisplay in awesomebuild quality is ...
11     ms teams hangs when the camera is switched on ...
12     received damaged laptop and it has been two we...
13     laptop has only 2 usb ports that too much clos...
14     repeatedly this hangs processor is very bad i ...
15     the product is really good for its pricepros:1...
16     purchased 1 month back cons below:hangs while ...
17     i bought this laptop for remote schooling of k...
18     doesn't reach expectationsgo for i3 processor on...
19     dear team hpi purchased this laptop on 3rd jul...

```

Name: Review Text, dtype: object

In [102...

```
hp_15s_reviews["Review Text"][0]
```

```
Out[102...] "this laptop is perfect for home and student use don't get blindsided by the negative reviews the item arrives in sturdy packaging which prevents it from damage during transit i myself use this laptop for university online meetings this laptop is not meant for high graphics gaming, low-resolution games are compatible rest assured is finebenefits:- heat: no heating issue while charging only the charging adapter and battery gets warm which is quite normal- charging time: gets charged in 2hr 30mn (0-100) playback time (normal usage)- 4 hrs- boot time: 10 secs switch-on & switch-off- writing speed: usb 30 (output to input) gives 80-120 mbps writing speed- display: fhd display, antiglare display lets you stream netflix, youtube & many more from any angle of the laptop- sound: based on a laptop system, the sound is quite good i hear music at volume 40/100- touchpad: smooth- pre-activated office 2019note:- purchase a sako silicon keyboard cover (black) as the visibility of the default key prints in daylight are not so efficiently visible- as shown in picture, the laptop must be kept above any plain hard surface so that the air circulation keeps running and does not gets heated- in many reviews, you will find that the laptop is getting heated, the worst laptop and all but one must know how to use it properly- at first, i was thinking of purchasing the same model only with ryzen 3 4300u processor but i changed my decision and stuck to this only because as compared to 4300u, in this laptop 3250u one gets 156 screen, rj-45 port, 1tb hdd, calculator keyboard- don't confuse yourself with the processors, someone will say quad-core is better than dual-core, and don't purchase this laptop as it is dual-core but trust me for home and student basic usage, this laptop is more than enough- if one plays a game or performs multi-high tasking software, then the laptop fan runs at high speed which is a bit noisy but don't worry its normal only- ddr4 2400 mghz is sufficient for a student and basic office meetings use- do check the warranty on hp's official website by entering the serial number which is present at the laptop base or product boxthat's all folks!!!"
```

```
In [103...] hp_15s_reviews["Review Title"] = hp_15s_reviews["Review Title"].str.lower()
```

```
In [104...] hp_15s_reviews["Review Title"]
```

```
Out[104...] 0                best laptop under 40k
1  ryzen 3  3250u much better than core i3 10th ...
2                all in all
3                highly recommended. go for it.
4                good
5  poor laptop for 41k - freezes with ms teams
6  does not work with microsoft teams app. it fre...
7                unsure of the configuration
8                worst ram
9  8 gb ram and 256 ssd still laptop and its task...
10               best laptop
11               ms teams hangs when camera is on
12  damaged product received and amazon not pickin...
13  both usb ports can't be used at once. disappoi...
14  dont buy this processor, this hangs a lot
15                an amazing laptop for students!
16                not a good product
17                not gud with microsoft teams
18  cheap quality cheap material cheap sounds,plea...
19                warranty not proper
Name: Review Title, dtype: object
```

```
In [105...] hp_15s_reviews
```

```
Out[105...]
   Laptop Variant  Reviewed Date  Reviewer Name  Rating  Review Title  Review Text
0    1TB HDD      2021-06-07    Amazon Customer    5    best laptop under 40k  this laptop is perfect for home and student us...
```

	Laptop Variant	Reviewed Date	Reviewer Name	Rating	Review Title	Review Text
1	1TB HDD 256GB SSD	2021-02-10	Shubhankar	5	ryzen 3 3250u much better than core i3 10th ...	one of the best product at this price
2	1TB HDD 256GB SSD	2021-02-07	karthik.v	4	all in all	very good after use of 9 months (updated)
3	1TB HDD 256GB SSD	2021-05-15	Kushal Mukherjee	5	highly recommended. go for it.	best laptop under 40k 1tb hdd, 256gb ssd, 8gb ...
4	1TB HDD 256GB SSD	2021-02-07	Yaswanth	5	good	super quality and display is awesome
5	1TB HDD 256GB SSD	2021-06-17	Sunita	1	poor laptop for 41k - freezes with ms teams	i bought this laptop for remote schooling of k...
6	1TB HDD 256GB SSD	2021-06-18	Amazon Customer	1	does not work with microsoft teams app. it fre...	i don't know how i missed the review given by ...
7	1TB HDD 256GB SSD	2021-05-02	Jai R. Curchorcar	1	unsure of the configuration	this laptop is overall a really good package, ...
8	1TB HDD 256GB SSD	2021-04-22	Kintu Solanki	1	worst ram	i would suggest not to buy this laptop it has ...
9	1TB HDD 256GB SSD	2021-06-29	Rishabh sinha	1	8 gb ram and 256 ssd still laptop and its task...	laptop is having 256 ssd and 8 gb ram still ha...
10	1TB HDD 256GB SSD	2021-03-25	Kamraan Javaid	5	best laptop	best laptopdisplay in awesomebuild quality is ...
11	1TB HDD 256GB SSD	2021-06-29	Dinesh	1	ms teams hangs when camera is on	ms teams hangs when the camera is switched on ...
12	1TB HDD 256GB SSD	2021-07-17	Vandana Kapoor	1	damaged product received and amazon not pickin...	received damaged laptop and it has been two we...
13	1TB HDD 256GB SSD	2021-07-23	NIRMAL JHA	1	both usb ports can't be used at once. disappoi...	laptop has only 2 usb ports that too much clos...
14	1TB HDD 256GB SSD	2021-04-27	KUNAL JOSHI	2	dont buy this processor, this hangs a lot	repeatedly this hangs processor is very bad i ...
15	1TB HDD 256GB SSD	2021-06-01	A literature student	5	an amazing laptop for students!	the product is really good for its pricepros:1...
16	1TB HDD 256GB SSD	2021-06-21	Kamna Sharma	1	not a good product	purchased 1 month back cons below:hangs while ...
17	1TB HDD 256GB SSD	2021-07-02	Supria	1	not gud with microsoft teams	i bought this laptop for remote schooling of k...
18	1TB HDD 256GB SSD	2021-05-29	ARJUN	1	cheap quality cheap material cheap sounds,plea...	doesn't reach expectationsgo for i3 processor on...
19	1TB HDD 256GB SSD	2021-07-09	AZIZ	1	warranty not proper	dear team hpi purchased this laptop on 3rd jul...

In [106...

```
hp_15s_reviews["Reviewer Name"] = hp_15s_reviews["Reviewer Name"].str.lower()
```

In [107...

```
hp_15s_reviews
```

Out[107...

	Laptop Variant	Reviewed Date	Reviewer Name	Rating	Review Title	Review Text
0	1TB HDD 256GB SSD	2021-06-07	amazon customer	5	best laptop under 40k	this laptop is perfect for home and student us...
1	1TB HDD 256GB SSD	2021-02-10	shubhankar	5	ryzen 3 3250u much better than core i3 10th ...	one of the best product at this price
2	1TB HDD 256GB SSD	2021-02-07	karthik.v	4	all in all	very good after use of 9 months (updated)
3	1TB HDD 256GB SSD	2021-05-15	kushal mukherjee	5	highly recommended. go for it.	best laptop under 40k 1tb hdd, 256gb ssd, 8gb ...
4	1TB HDD 256GB SSD	2021-02-07	yaswanth	5	good	super quality and display is awesome
5	1TB HDD 256GB SSD	2021-06-17	sunita	1	poor laptop for 41k - freezes with ms teams	i bought this laptop for remote schooling of k...
6	1TB HDD 256GB SSD	2021-06-18	amazon customer	1	does not work with microsoft teams app. it fre...	i don't know how i missed the review given by ...
7	1TB HDD 256GB SSD	2021-05-02	jai r. curchorcar	1	unsure of the configuration	this laptop is overall a really good package, ...
8	1TB HDD 256GB SSD	2021-04-22	kintu solanki	1	worst ram	i would suggest not to buy this laptop it has ...
9	1TB HDD 256GB SSD	2021-06-29	rishabh sinha	1	8 gb ram and 256 ssd still laptop and its task...	laptop is having 256 ssd and 8 gb ram still ha...
10	1TB HDD 256GB SSD	2021-03-25	kamraan javaid	5	best laptop	best laptopdisplay in awesomebuild quality is ...
11	1TB HDD 256GB SSD	2021-06-29	dinesh	1	ms teams hangs when camera is on	ms teams hangs when the camera is switched on ...
12	1TB HDD 256GB SSD	2021-07-17	vandana kapoor	1	damaged product received and amazon not pickin...	received damaged laptop and it has been two we...
13	1TB HDD 256GB SSD	2021-07-23	nirmal jha	1	both usb ports can't be used at once. disappoi...	laptop has only 2 usb ports that too much clos...
14	1TB HDD 256GB SSD	2021-04-27	kunal joshi	2	dont buy this processor, this hangs a lot	repeatedly this hangs processor is very bad i ...
15	1TB HDD 256GB SSD	2021-06-01	a literature student	5	an amazing laptop for students!	the product is really good for its pricepros:1...
16	1TB HDD 256GB SSD	2021-06-21	kamna sharma	1	not a good product	purchased 1 month back cons below:hangs while ...
17	1TB HDD 256GB SSD	2021-07-02	supria	1	not gud with microsoft teams	i bought this laptop for remote schooling of k...
18	1TB HDD 256GB SSD	2021-05-29	arjun	1	cheap quality cheap material cheap sounds,plea...	doesn't reach expectationsgo for i3 processor on...
19	1TB HDD 256GB SSD	2021-07-09	aziz	1	warranty not proper	dear team hpi purchased this laptop on 3rd jul...

In [108...

```
hp_15s_reviews["Laptop Variant"] = hp_15s_reviews["Laptop Variant"].str.lower()
```

In [109...

hp\_15s\_reviews

Out[109...

	Laptop Variant	Reviewed Date	Reviewer Name	Rating	Review Title	Review Text
0	1tb hdd 256gb ssd	2021-06-07	amazon customer	5	best laptop under 40k	this laptop is perfect for home and student us...
1	1tb hdd 256gb ssd	2021-02-10	shubhankar	5	ryzen 3 3250u much better than core i3 10th ...	one of the best product at this price
2	1tb hdd 256gb ssd	2021-02-07	karthik.v	4	all in all	very good after use of 9 months (updated)
3	1tb hdd 256gb ssd	2021-05-15	kushal mukherjee	5	highly recommended. go for it.	best laptop under 40k 1tb hdd, 256gb ssd, 8gb ...
4	1tb hdd 256gb ssd	2021-02-07	yaswanth	5	good	super quality and display is awesome
5	1tb hdd 256gb ssd	2021-06-17	sunita	1	poor laptop for 41k - freezes with ms teams	i bought this laptop for remote schooling of k...
6	1tb hdd 256gb ssd	2021-06-18	amazon customer	1	does not work with microsoft teams app. it fre...	i don't know how i missed the review given by ...
7	1tb hdd 256gb ssd	2021-05-02	jai r. curchorcar	1	unsure of the configuration	this laptop is overall a really good package, ...
8	1tb hdd 256gb ssd	2021-04-22	kintu solanki	1	worst ram	i would suggest not to buy this laptop it has ...
9	1tb hdd 256gb ssd	2021-06-29	rishabh sinha	1	8 gb ram and 256 ssd still laptop and its task...	laptop is having 256 ssd and 8 gb ram still ha...
10	1tb hdd 256gb ssd	2021-03-25	kamraan javaid	5	best laptop	best laptopdisplay in awesomebuild quality is ...
11	1tb hdd 256gb ssd	2021-06-29	dinesh	1	ms teams hangs when camera is on	ms teams hangs when the camera is switched on ...
12	1tb hdd 256gb ssd	2021-07-17	vandana kapoor	1	damaged product received and amazon not pickin...	received damaged laptop and it has been two we...
13	1tb hdd 256gb ssd	2021-07-23	nirmal jha	1	both usb ports can't be used at once. disappoi...	laptop has only 2 usb ports that too much clos...
14	1tb hdd 256gb ssd	2021-04-27	kunal joshi	2	dont buy this processor, this hangs a lot	repeatedly this hangs processor is very bad i ...
15	1tb hdd 256gb ssd	2021-06-01	a literature student	5	an amazing laptop for students!	the product is really good for its pricepros:1...
16	1tb hdd 256gb ssd	2021-06-21	kamna sharma	1	not a good product	purchased 1 month back cons below:hangs while ...
17	1tb hdd 256gb ssd	2021-07-02	supria	1	not gud with microsoft teams	i bought this laptop for remote schooling of k...
18	1tb hdd 256gb ssd	2021-05-29	arjun	1	cheap quality cheap material cheap sounds,plea...	doesn't reach expectationsgo for i3 processor on...
19	1tb hdd 256gb ssd	2021-07-09	aziz	1	warranty not proper	dear team hpi purchased this laptop on 3rd jul...

```
In [110...] hp_15s_reviews["Laptop Variant"]
```

```
Out[110...] 0      1tb hdd  256gb ssd
            1      1tb hdd  256gb ssd
            2      1tb hdd  256gb ssd
            3      1tb hdd  256gb ssd
            4      1tb hdd  256gb ssd
            5      1tb hdd  256gb ssd
            6      1tb hdd  256gb ssd
            7      1tb hdd  256gb ssd
            8      1tb hdd  256gb ssd
            9      1tb hdd  256gb ssd
           10      1tb hdd  256gb ssd
           11      1tb hdd  256gb ssd
           12      1tb hdd  256gb ssd
           13      1tb hdd  256gb ssd
           14      1tb hdd  256gb ssd
           15      1tb hdd  256gb ssd
           16      1tb hdd  256gb ssd
           17      1tb hdd  256gb ssd
           18      1tb hdd  256gb ssd
           19      1tb hdd  256gb ssd
Name: Laptop Variant, dtype: object
```

```
In [111...] hp_15s_reviews["Review Title"]
```

```
Out[111...] 0      best laptop under 40k
            1      ryzen 3 3250u much better than core i3 10th ...
            2      all in all
            3      highly recommended. go for it.
            4      good
            5      poor laptop for 41k - freezes with ms teams
            6      does not work with microsoft teams app. it fre...
            7      unsure of the configuration
            8      worst ram
            9      8 gb ram and 256 ssd still laptop and its task...
           10      best laptop
           11      ms teams hangs when camera is on
           12      damaged product received and amazon not pickin...
           13      both usb ports can't be used at once. disappoi...
           14      dont buy this processor, this hangs a lot
           15      an amazing laptop for students!
           16      not a good product
           17      not gud with microsoft teams
           18      cheap quality cheap material cheap sounds,plea...
           19      warranty not proper
Name: Review Title, dtype: object
```

```
In [112...] hp_15s_reviews["Review Title"][9]
```

```
Out[112...] '8 gb ram and 256 ssd still laptop and its task manager keeps hanging and then booti
ng takes forever'
```

```
In [113...] hp_15s_reviews["Review Text"]
```

```
Out[113...] 0      this laptop is perfect for home and student us...
            1      one of the best product at this price
            2      very good after use of 9 months (updated)
            3      best laptop under 40k 1tb hdd, 256gb ssd, 8gb ...
            4      super quality and display is awesome
            5      i bought this laptop for remote schooling of k...
            6      i don't know how i missed the review given by ...
            7      this laptop is overall a really good package, ...
            8      i would suggest not to buy this laptop it has ...
            9      laptop is having 256 ssd and 8 gb ram still ha...
```

```

10 best laptopdisplay in awesomebuild quality is ...
11 ms teams hangs when the camera is switched on ...
12 received damaged laptop and it has been two we...
13 laptop has only 2 usb ports that too much clos...
14 repeatedly this hangs processor is very bad i ...
15 the product is really good for its pricepros:1...
16 purchased 1 month back cons below:hangs while ...
17 i bought this laptop for remote schooling of k...
18 doesn't reach expectationsgo for i3 processor on...
19 dear team hpi purchased this laptop on 3rd jul...
Name: Review Text, dtype: object

```

In [114...

```
hp_15s_reviews["Review Text"][9]
```

Out[114...

```
'laptop is having 256 ssd and 8 gb ram still hangs while opening simple application
and browsers on top of that task manager also crashes only a hard reboot then fixes
the issue attaching video poof of booting time disappointing'
```

In [115...

```
hp_15s_reviews
```

Out[115...

	Laptop Variant	Reviewed Date	Reviewer Name	Rating	Review Title	Review Text
0	1tb hdd 256gb ssd	2021-06-07	amazon customer	5	best laptop under 40k	this laptop is perfect for home and student us...
1	1tb hdd 256gb ssd	2021-02-10	shubhankar	5	ryzen 3 3250u much better than core i3 10th ...	one of the best product at this price
2	1tb hdd 256gb ssd	2021-02-07	karthik.v	4	all in all	very good after use of 9 months (updated)
3	1tb hdd 256gb ssd	2021-05-15	kushal mukherjee	5	highly recommended. go for it.	best laptop under 40k 1tb hdd, 256gb ssd, 8gb ...
4	1tb hdd 256gb ssd	2021-02-07	yaswanth	5	good	super quality and display is awesome
5	1tb hdd 256gb ssd	2021-06-17	sunita	1	poor laptop for 41k - freezes with ms teams	i bought this laptop for remote schooling of k...
6	1tb hdd 256gb ssd	2021-06-18	amazon customer	1	does not work with microsoft teams app. it fre...	i don't know how i missed the review given by ...
7	1tb hdd 256gb ssd	2021-05-02	jai r. curchorcar	1	unsure of the configuration	this laptop is overall a really good package, ...
8	1tb hdd 256gb ssd	2021-04-22	kintu solanki	1	worst ram	i would suggest not to buy this laptop it has ...
9	1tb hdd 256gb ssd	2021-06-29	rishabh sinha	1	8 gb ram and 256 ssd still laptop and its task...	laptop is having 256 ssd and 8 gb ram still ha...
10	1tb hdd 256gb ssd	2021-03-25	kamraan javaid	5	best laptop	best laptopdisplay in awesomebuild quality is ...
11	1tb hdd 256gb ssd	2021-06-29	dinesh	1	ms teams hangs when camera is on	ms teams hangs when the camera is switched on ...
12	1tb hdd 256gb ssd	2021-07-17	vandana kapoor	1	damaged product received and amazon not pickin...	received damaged laptop and it has been two we...
13	1tb hdd 256gb ssd	2021-07-23	nirmal jha	1	both usb ports can't be used at once. disappoi...	laptop has only 2 usb ports that too much clos...



	Laptop Variant	Reviewed Date	Reviewer Name	Rating	Review Title	Review Text
14	1tb hdd 256gb ssd	2021-04-27	kunal joshi	2	dont buy this processor, this hangs a lot	repeatedly this hangs processor is very bad i ...
15	1tb hdd 256gb ssd	2021-06-01	a literature student	5	an amazing laptop for students!	the product is really good for its pricepros:1...
16	1tb hdd 256gb ssd	2021-06-21	kamna sharma	1	not a good product	purchased 1 month back cons below:hangs while ...
17	1tb hdd 256gb ssd	2021-07-02	supria	1	not gud with microsoft teams	i bought this laptop for remote schooling of k...
18	1tb hdd 256gb ssd	2021-05-29	arjun	1	cheap quality cheap material cheap sounds,plea...	doesn't reach expectationsgo for i3 processor on...
19	1tb hdd 256gb ssd	2021-07-09	aziz	1	warranty not proper	dear team hpi purchased this laptop on 3rd jul...

In [117...

hp\_15s\_reviews.to\_excel('hp\_15s\_reviews\_pre\_processed.xlsx', index=False)

In [ ]: