Minneapolis College Library Springshare Data Analysis

Homepage Views

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5/2023

In [1]:
```
# Import dependencies

from datetime import datetime as dt
from scipy import stats as st

import matplotlib.pyplot as plt
import matplotlib.dates as mdates
import pandas as pd
```

In [2]:
```
homepage_df_alltime = pd.read_csv("homepage_alltime.csv")
```

In [3]:
```
homepage_df_alltime.head(25)
```

Out[3]:

	Date	Views
0	2013-02	0
1	2013-03	0
2	2013-04	0
3	2013-05	0
4	2013-06	0
5	2013-07	0
6	2013-08	0
7	2013-09	0
8	2013-10	0
9	2013-11	0
10	2013-12	0
11	2014-01	0
12	2014-02	0
13	2014-03	0
14	2014-04	0
15	2014-05	0
16	2014-06	0
17	2014-07	4
18	2014-08	21
19	2014-09	28
20	2014-10	15
21	2014-11	4
22	2014-12	8
23	2015-01	1
24	2015-02	9

In [4]:
```
homepage_df_alltime.tail(25)
```

Out[4]:

	Date	Views
99	2021-05	9
100	2021-06	15
101	2021-07	57
102	2021-08	10
103	2021-09	28
104	2021-10	38
105	2021-11	11
106	2021-12	15
107	2022-01	30
108	2022-02	43
109	2022-03	5
110	2022-04	24
111	2022-05	15
112	2022-06	12
113	2022-07	31
114	2022-08	20
115	2022-09	13
116	2022-10	12
117	2022-11	12
118	2022-12	16
119	2023-01	7
120	2023-02	5
121	2023-03	18
122	2023-04	32
123	2023-05	0

In [5]:
```
# Remove first and last rows with minimal data

homepage_df_alltime = homepage_df_alltime.loc[ ((homepage_df_alltime["Date'
                                                 (homepage_df_alltime["Date'
homepage_df_alltime = homepage_df_alltime.reset_index(drop=True)

homepage_df_alltime
```

Out[5]:

	Date	Views
0	2014-07	4
1	2014-08	21
2	2014-09	28
3	2014-10	15
4	2014-11	4
...	...	...
101	2022-12	16
102	2023-01	7
103	2023-02	5
104	2023-03	18
105	2023-04	32

106 rows × 2 columns

In [6]:
```
# Get basic info on this dataset

homepage_df_alltime.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 106 entries, 0 to 105
Data columns (total 2 columns):
 #   Column  Non-Null Count  Dtype 
---  ------  --------------  ----- 
 0   Date    106 non-null    object
 1   Views   106 non-null    int64 
dtypes: int64(1), object(1)
memory usage: 1.8+ KB
```

In [7]:
```
# Checking for null values in Views column

homepage_df_alltime["Views"].isna().sum()
```

Out[7]:
```
0
```

In [8]:
```
# Summary stats for Total column

homepage_df_alltime["Views"].describe()
```

Out[8]:
```
count    106.00000
mean      17.54717
std       15.72752
min        0.00000
25%        8.00000
50%       13.00000
75%       21.00000
max       96.00000
Name: Views, dtype: float64
```

In [9]:
```
homepage_df_alltime["Date"] = pd.to_datetime(homepage_df_alltime["Date"])
```

In [10]:
```
homepage_df_alltime.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 106 entries, 0 to 105
Data columns (total 2 columns):
 #   Column  Non-Null Count  Dtype
---  ------  --------------  -----
 0   Date    106 non-null    datetime64[ns]
 1   Views   106 non-null    int64
dtypes: datetime64[ns](1), int64(1)
memory usage: 1.8 KB
```

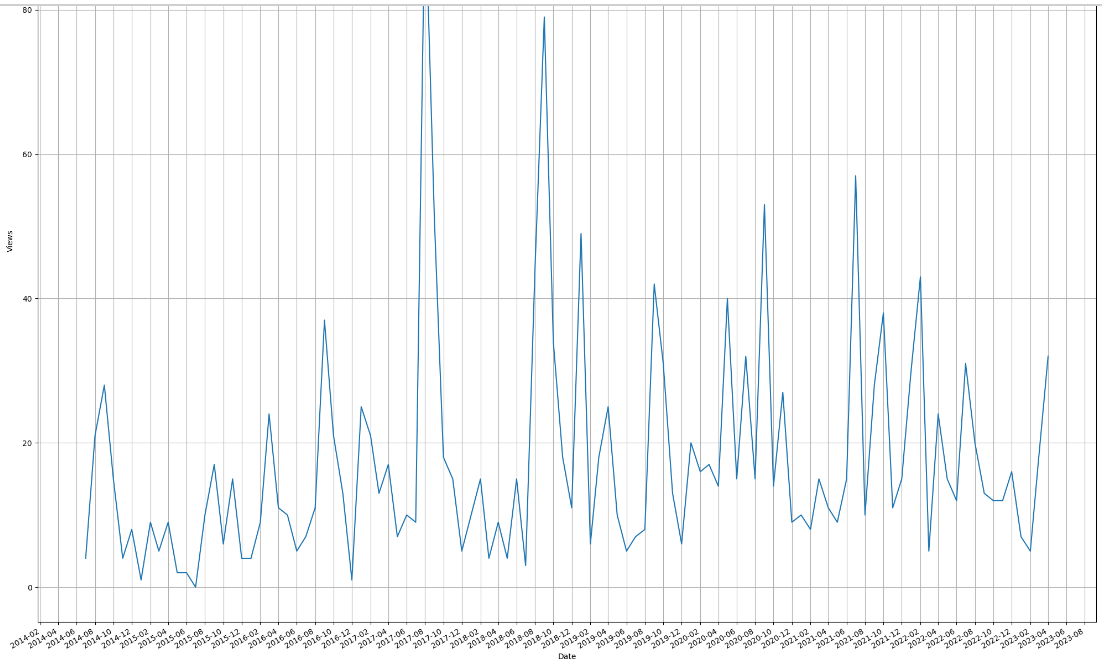
In [11]:
```
homepage_df_alltime
```

Out[11]:

	Date	Views
0	2014-07-01	4
1	2014-08-01	21
2	2014-09-01	28
3	2014-10-01	15
4	2014-11-01	4
...	...	...
101	2022-12-01	16
102	2023-01-01	7
103	2023-02-01	5
104	2023-03-01	18
105	2023-04-01	32

106 rows × 2 columns

In [12]:
```
fig, ax = plt.subplots(figsize=(20, 15))

ax.set_title("Homepage Views Views by Date (2014-present)")
ax.grid(True)
ax.set_xlabel("Date")
ax.set_ylabel("Views")

month_locator = mdates.MonthLocator(interval=2)
year_month_formatter = mdates.DateFormatter("%Y-%m") # four digits for year

# Same as above
ax.xaxis.set_major_locator(month_locator)
ax.xaxis.set_major_formatter(year_month_formatter)
ax.plot(homepage_df_alltime["Date"], homepage_df_alltime["Views"])

fig.autofmt_xdate()
plt.tight_layout()

fig.savefig("Homepage/homepage.png")
```



Analysis by Terms

In [13]:

```
homepage_summer_terms = homepage_df_alltime.loc[(homepage_df_alltime["Date"
                                                 (homepage_df_alltime["Date"].dt.mont
                                                 (homepage_df_alltime["Date"].dt.mont
homepage_summer_terms = homepage_summer_terms.reset_index(drop=True)

homepage_summer_terms["Formatted_Date"] = homepage_summer_terms["Date"].dt.

homepage_summer_terms
```

Out[13]:

	Date	Views	Formatted_Date
0	2014-07-01	4	07-2014
1	2015-05-01	2	05-2015
2	2015-06-01	2	06-2015
3	2015-07-01	0	07-2015
4	2016-05-01	10	05-2016
5	2016-06-01	5	06-2016
6	2016-07-01	7	07-2016
7	2017-05-01	7	05-2017
8	2017-06-01	10	06-2017
9	2017-07-01	9	07-2017
10	2018-05-01	4	05-2018
11	2018-06-01	15	06-2018
12	2018-07-01	3	07-2018
13	2019-05-01	10	05-2019
14	2019-06-01	5	06-2019
15	2019-07-01	7	07-2019
16	2020-05-01	40	05-2020
17	2020-06-01	15	06-2020
18	2020-07-01	32	07-2020
19	2021-05-01	9	05-2021
20	2021-06-01	15	06-2021
21	2021-07-01	57	07-2021
22	2022-05-01	15	05-2022
23	2022-06-01	12	06-2022
24	2022-07-01	31	07-2022

In [14]:
```
homepage_fall_terms = homepage_df_alltime.loc[(homepage_df_alltime["Date"].
                                          (homepage_df_alltime["Date"].dt.mont
                                          (homepage_df_alltime["Date"].dt.mont
                                          (homepage_df_alltime["Date"].dt.mont
                                          (homepage_df_alltime["Date"].dt.mont
homepage_fall_terms = homepage_fall_terms.reset_index(drop=True)

homepage_fall_terms["Formatted_Date"] = homepage_fall_terms["Date"].dt.strf

homepage_fall_terms
```

Out[14]:

	Date	Views	Formatted_Date
0	2014-08-01	21	08-2014
1	2014-09-01	28	09-2014
2	2014-10-01	15	10-2014
3	2014-11-01	4	11-2014
4	2014-12-01	8	12-2014
5	2015-08-01	10	08-2015
6	2015-09-01	17	09-2015
7	2015-10-01	6	10-2015
8	2015-11-01	15	11-2015
9	2015-12-01	4	12-2015
10	2016-08-01	11	08-2016
11	2016-09-01	37	09-2016
12	2016-10-01	21	10-2016
13	2016-11-01	13	11-2016
14	2016-12-01	1	12-2016
15	2017-08-01	96	08-2017
16	2017-09-01	51	09-2017
17	2017-10-01	18	10-2017
18	2017-11-01	15	11-2017
19	2017-12-01	5	12-2017
20	2018-08-01	44	08-2018
21	2018-09-01	79	09-2018
22	2018-10-01	34	10-2018
23	2018-11-01	18	11-2018
24	2018-12-01	11	12-2018
25	2019-08-01	8	08-2019
26	2019-09-01	42	09-2019
27	2019-10-01	31	10-2019
28	2019-11-01	13	11-2019
29	2019-12-01	6	12-2019
30	2020-08-01	15	08-2020
31	2020-09-01	53	09-2020
32	2020-10-01	14	10-2020
33	2020-11-01	27	11-2020
34	2020-12-01	9	12-2020

	Date	Views	Formatted_Date
35	2021-08-01	10	08-2021
36	2021-09-01	28	09-2021
37	2021-10-01	38	10-2021
38	2021-11-01	11	11-2021
39	2021-12-01	15	12-2021
40	2022-08-01	20	08-2022
41	2022-09-01	13	09-2022
42	2022-10-01	12	10-2022
43	2022-11-01	12	11-2022
44	2022-12-01	16	12-2022

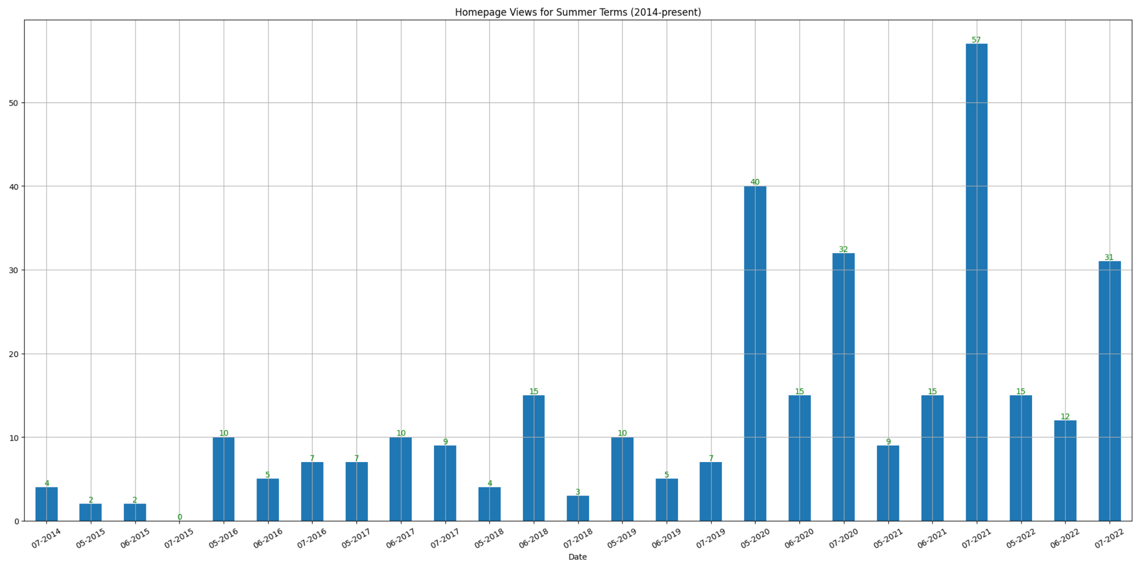
In [15]:
```
homepage_spring_terms = homepage_df_alltime.loc[(homepage_df_alltime["Date'
                                       (homepage_df_alltime["Date"].dt.mont
                                       (homepage_df_alltime["Date"].dt.mont
                                       (homepage_df_alltime["Date"].dt.mont
homepage_spring_terms = homepage_spring_terms.reset_index(drop=True)

homepage_spring_terms["Formatted_Date"] = homepage_spring_terms["Date"].dt.

homepage_spring_terms
```

Out[15]:

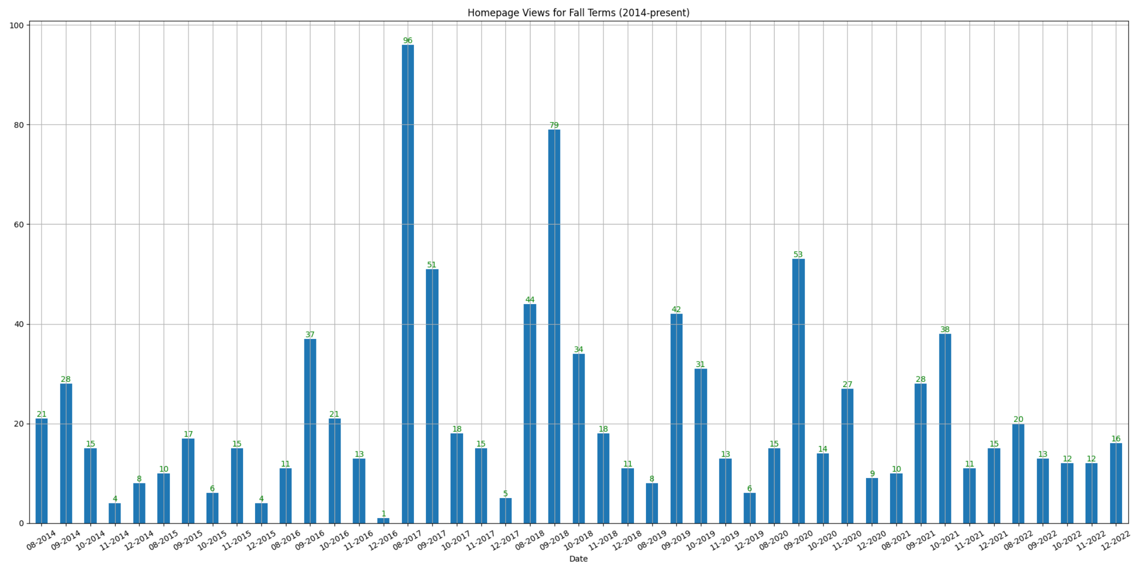
	Date	Views	Formatted_Date
0	2015-01-01	1	01-2015
1	2015-02-01	9	02-2015
2	2015-03-01	5	03-2015
3	2015-04-01	9	04-2015
4	2016-01-01	4	01-2016
5	2016-02-01	9	02-2016
6	2016-03-01	24	03-2016
7	2016-04-01	11	04-2016
8	2017-01-01	25	01-2017
9	2017-02-01	21	02-2017
10	2017-03-01	13	03-2017
11	2017-04-01	17	04-2017
12	2018-01-01	10	01-2018
13	2018-02-01	15	02-2018
14	2018-03-01	4	03-2018
15	2018-04-01	9	04-2018
16	2019-01-01	49	01-2019
17	2019-02-01	6	02-2019
18	2019-03-01	18	03-2019
19	2019-04-01	25	04-2019
20	2020-01-01	20	01-2020
21	2020-02-01	16	02-2020
22	2020-03-01	17	03-2020
23	2020-04-01	14	04-2020
24	2021-01-01	10	01-2021
25	2021-02-01	8	02-2021
26	2021-03-01	15	03-2021
27	2021-04-01	11	04-2021
28	2022-01-01	30	01-2022
29	2022-02-01	43	02-2022
30	2022-03-01	5	03-2022
31	2022-04-01	24	04-2022
32	2023-01-01	7	01-2023
33	2023-02-01	5	02-2023
34	2023-03-01	18	03-2023

	Date	Views	Formatted_Date
35	2023-04-01	32	04-2023

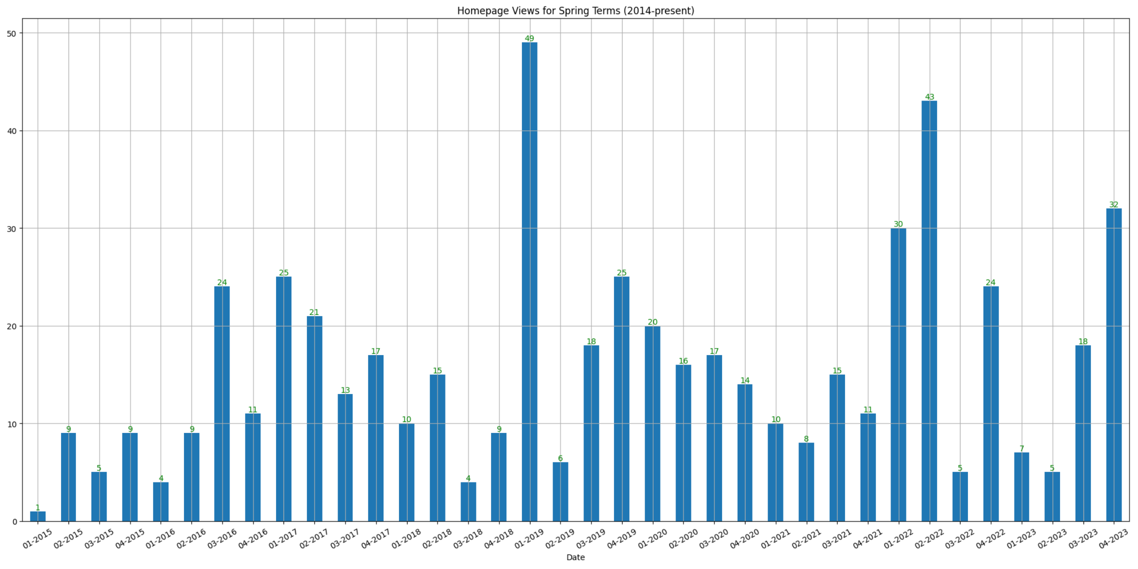
In [16]:
```
ax = homepage_summer_terms.plot(
        x="Formatted_Date",
        y="Views",
        figsize=(20,10),
        kind="bar",
        legend=False,
        grid=True,
        rot=30,
        xlabel="Date",
        title=f"Homepage Views for Summer Terms (2014-present)")

ax.bar_label(ax.containers[0], color="green")
plt.tight_layout()

plt.savefig("Homepage/homepage_summers.png")

plt.show()
```



In [17]:
```
ax = homepage_fall_terms.plot(
        x="Formatted_Date",
        y="Views",
        figsize=(20,10),
        kind="bar",
        legend=False,
        grid=True,
        rot=30,
        xlabel="Date",
        title=f"Homepage Views for Fall Terms (2014-present)")

ax.bar_label(ax.containers[0], color="green")
plt.tight_layout()

plt.savefig("Homepage/homepage_fall.png")

plt.show()
```



In [18]:
```
ax = homepage_spring_terms.plot(
        x="Formatted_Date",
        y="Views",
        figsize=(20,10),
        kind="bar",
        legend=False,
        grid=True,
        rot=30,
        xlabel="Date",
        title=f"Homepage Views for Spring Terms (2014-present)")

ax.bar_label(ax.containers[0], color="green")
plt.tight_layout()

plt.savefig("Homepage/homepage_spring.png")

plt.show()
```

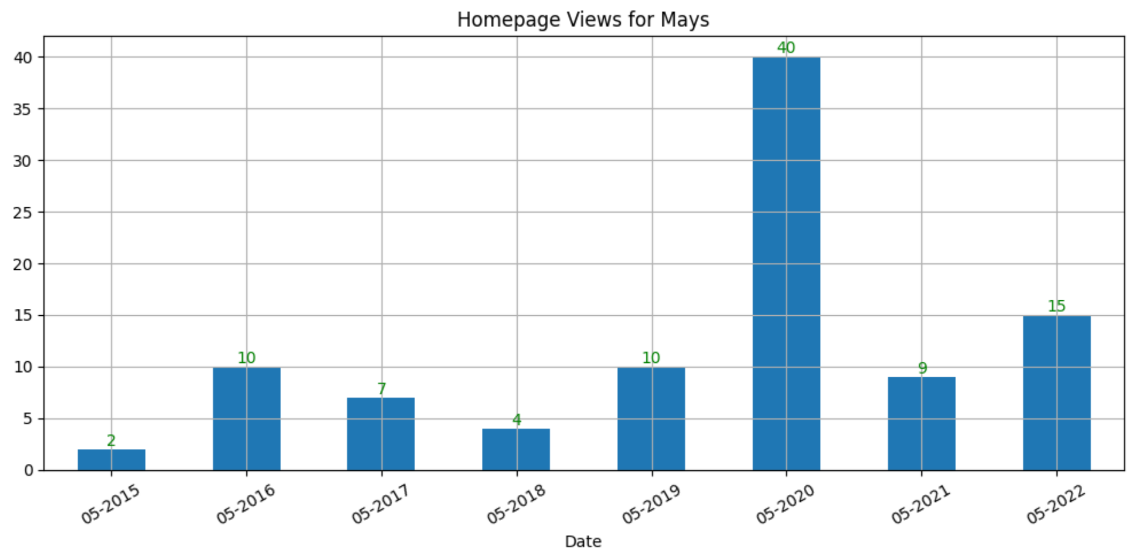


In [19]:
```
homepage_summer_bymonth = homepage_summer_terms.sort_values(by="Formatted_D
homepage_summer_bymonth

mays = homepage_summer_bymonth.loc[ (homepage_summer_bymonth["Formatted_Dat
junes = homepage_summer_bymonth.loc[ (homepage_summer_bymonth["Formatted_Da
julys = homepage_summer_bymonth.loc[ (homepage_summer_bymonth["Formatted_Da
```

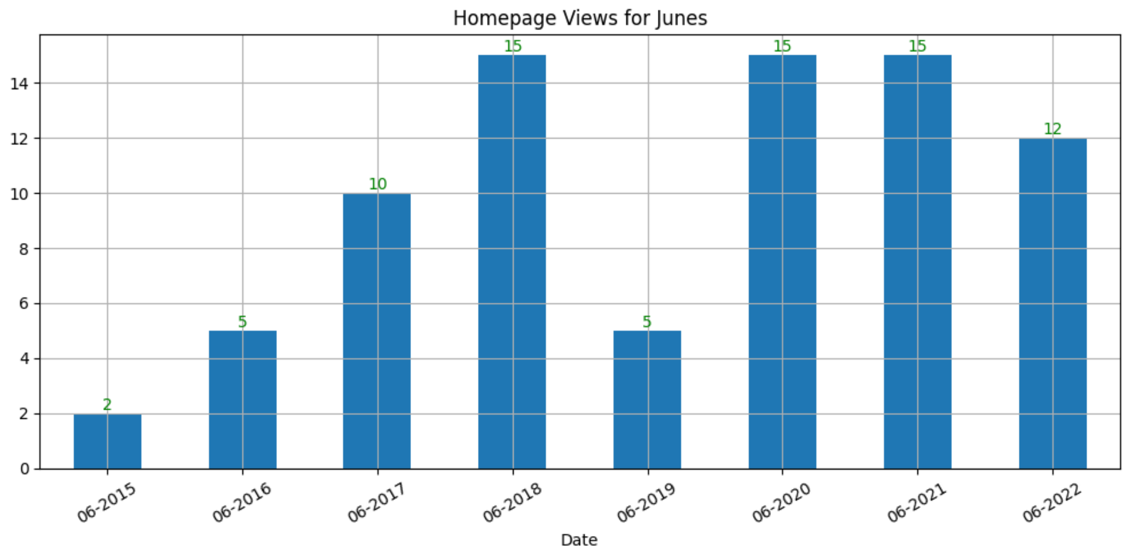
In [20]:
```
homepage_fall_bymonth = homepage_fall_terms.sort_values(by="Formatted_Date'
homepage_fall_bymonth = homepage_fall_bymonth.reset_index(drop=True)
homepage_fall_bymonth

augusts = homepage_fall_bymonth.loc[ (homepage_fall_bymonth["Formatted_Date
septembers = homepage_fall_bymonth.loc[ (homepage_fall_bymonth["Formatted_D
octobers = homepage_fall_bymonth.loc[ (homepage_fall_bymonth["Formatted_Dat
novembers = homepage_fall_bymonth.loc[ (homepage_fall_bymonth["Formatted_Da
decembers = homepage_fall_bymonth.loc[ (homepage_fall_bymonth["Formatted_Da
```

In [21]:
```
homepage_spring_bymonth = homepage_spring_terms.sort_values(by="Formatted_D
homepage_spring_bymonth = homepage_spring_bymonth.reset_index(drop=True)
homepage_spring_bymonth

januarys = homepage_spring_bymonth.loc[ (homepage_spring_bymonth["Formattec
februarys = homepage_spring_bymonth.loc[ (homepage_spring_bymonth["Formatte
marchs = homepage_spring_bymonth.loc[ (homepage_spring_bymonth["Formatted_D
aprils = homepage_spring_bymonth.loc[ (homepage_spring_bymonth["Formatted_D
```

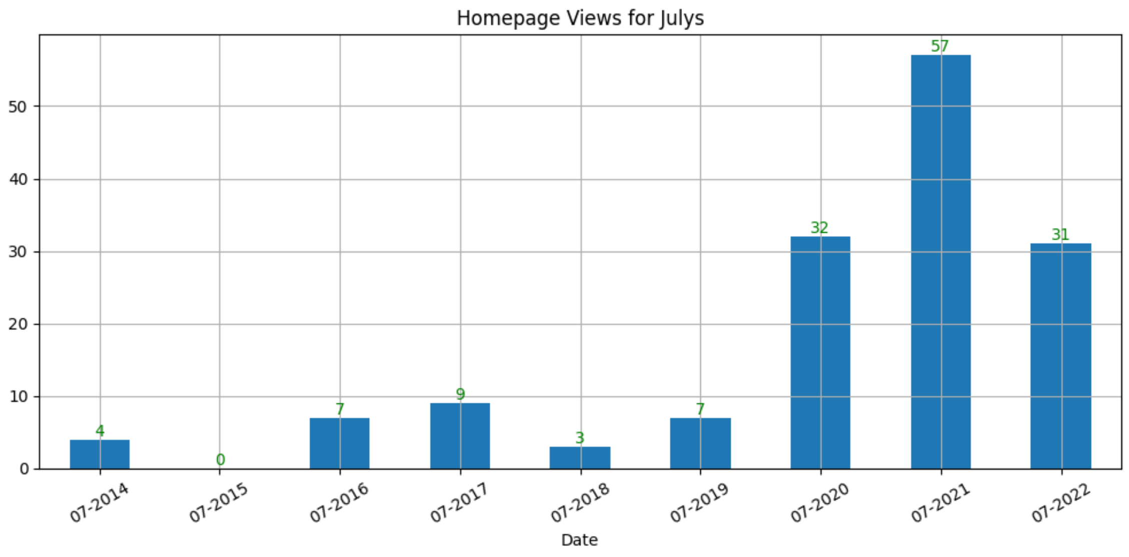
In [22]:
```
ax5 = mays.plot(
        x="Formatted_Date",
        y="Views",
        figsize=(10,5),
        kind="bar",
        legend=False,
        grid=True,
        rot=30,
        xlabel="Date",
        title=f"Homepage Views for Mays"
)

ax5.bar_label(ax5.containers[0], color="green")
plt.tight_layout()

plt.savefig("Homepage/mays.png")
```



In [23]:
```
ax6 = junes.plot(
        x="Formatted_Date",
        y="Views",
        figsize=(10,5),
        kind="bar",
        legend=False,
        grid=True,
        rot=30,
        xlabel="Date",
        title=f"Homepage Views for Junes")

ax6.bar_label(ax6.containers[0], color="green")
plt.tight_layout()

plt.savefig("Homepage/junes.png")
```

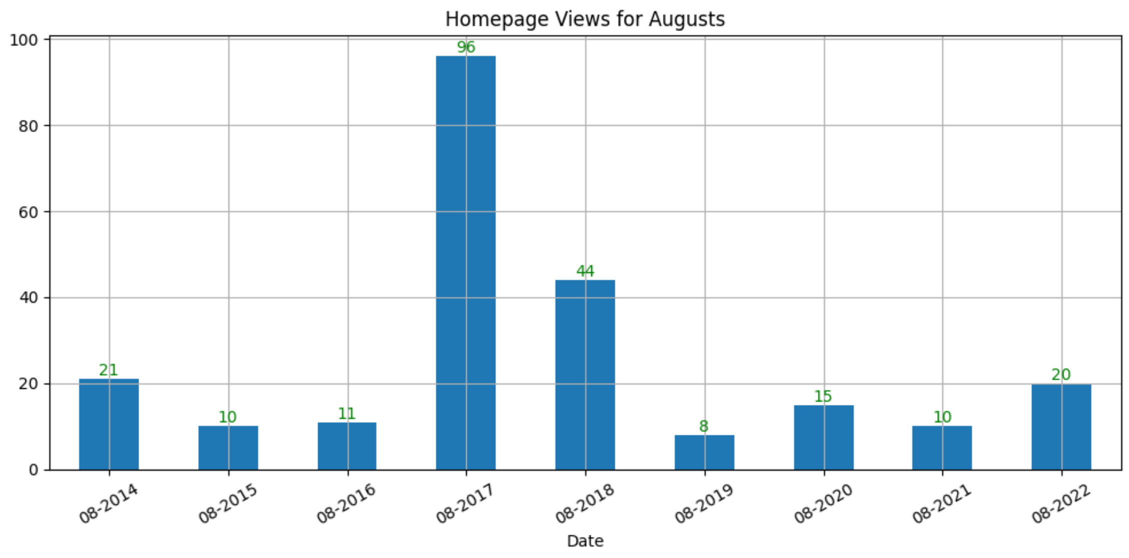


In [24]:
```
ax7 = julys.plot(
        x="Formatted_Date",
        y="Views",
        figsize=(10,5),
        kind="bar",
        legend=False,
        grid=True,
        rot=30,
        xlabel="Date",
        title=f"Homepage Views for Julys")

ax7.bar_label(ax7.containers[0], color="green")
plt.tight_layout()

plt.savefig("Homepage/julys.png")
```

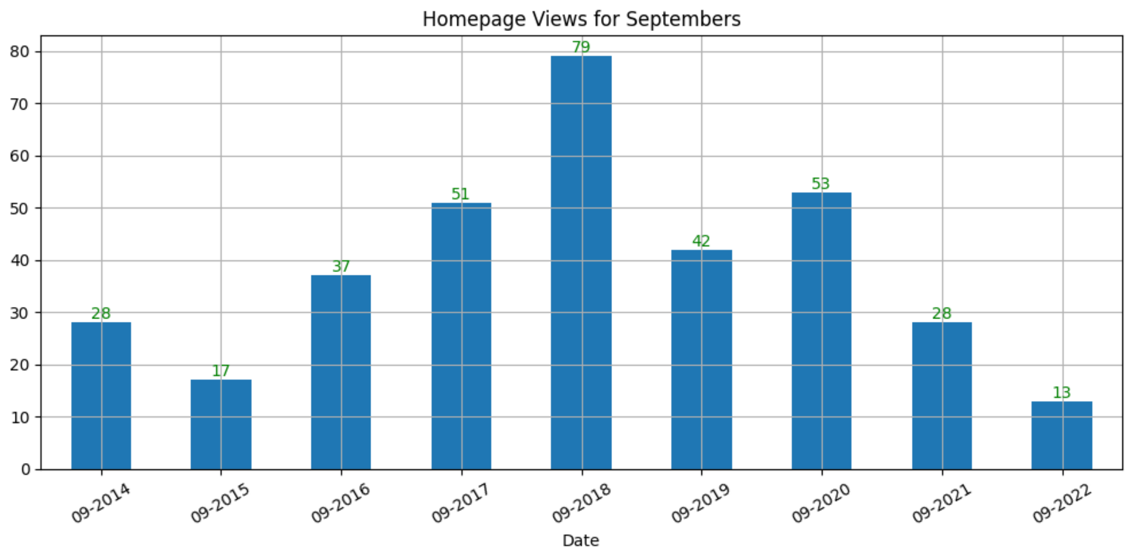


In [25]:

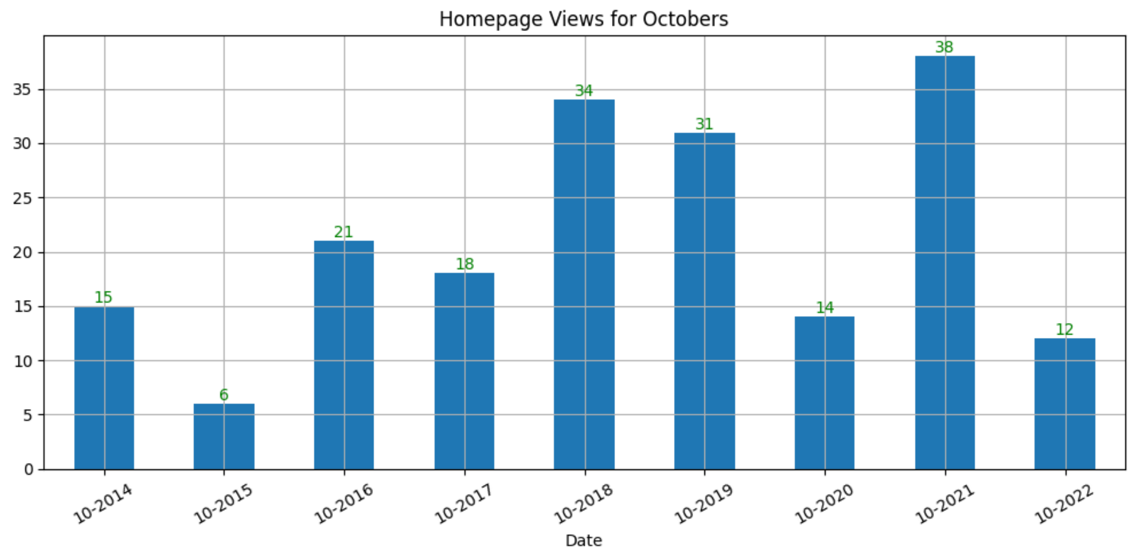
```
ax8 = augusts.plot(
        x="Formatted_Date",
        y="Views",
        figsize=(10,5),
        kind="bar",
        legend=False,
        grid=True,
        rot=30,
        xlabel="Date",
        title=f"Homepage Views for Augusts"
)

ax8.bar_label(ax8.containers[0], color="green")
plt.tight_layout()

plt.savefig("Homepage/augusts.png")
```



In [26]:
```
ax9 = septembers.plot(
        x="Formatted_Date",
        y="Views",
        figsize=(10,5),
        kind="bar",
        legend=False,
        grid=True,
        rot=30,
        xlabel="Date",
        title=f"Homepage Views for Septembers"
)

ax9.bar_label(ax9.containers[0], color="green")
plt.tight_layout()

plt.savefig("Homepage/septembers.png")
```

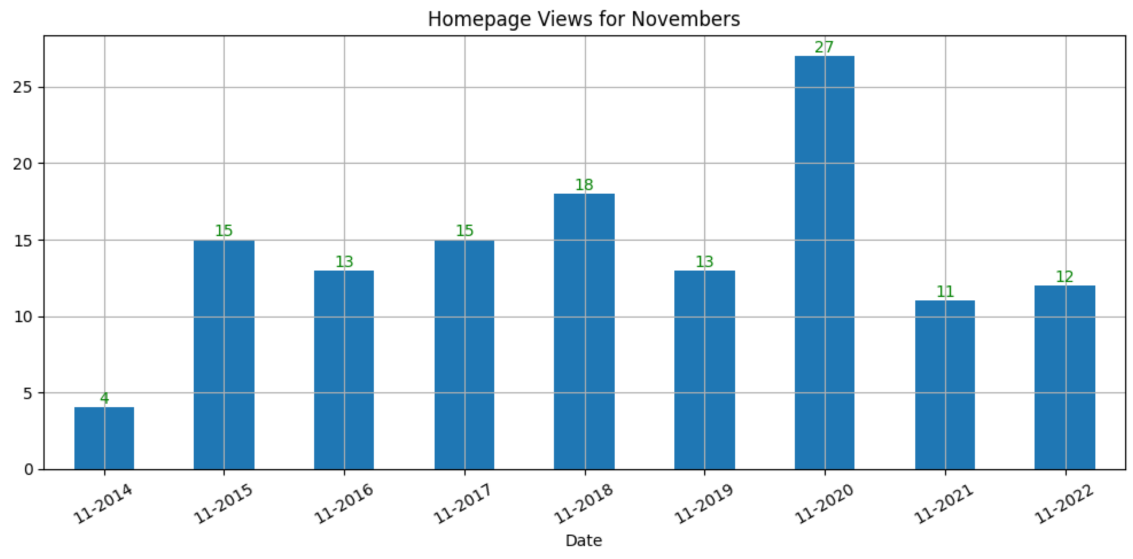


In [27]:
```
ax10 = octobers.plot(
        x="Formatted_Date",
        y="Views",
        figsize=(10,5),
        kind="bar",
        legend=False,
        grid=True,
        rot=30,
        xlabel="Date",
        title=f"Homepage Views for Octobers"
)

ax10.bar_label(ax10.containers[0], color="green")
plt.tight_layout()

plt.savefig("Homepage/octobers.png")
```

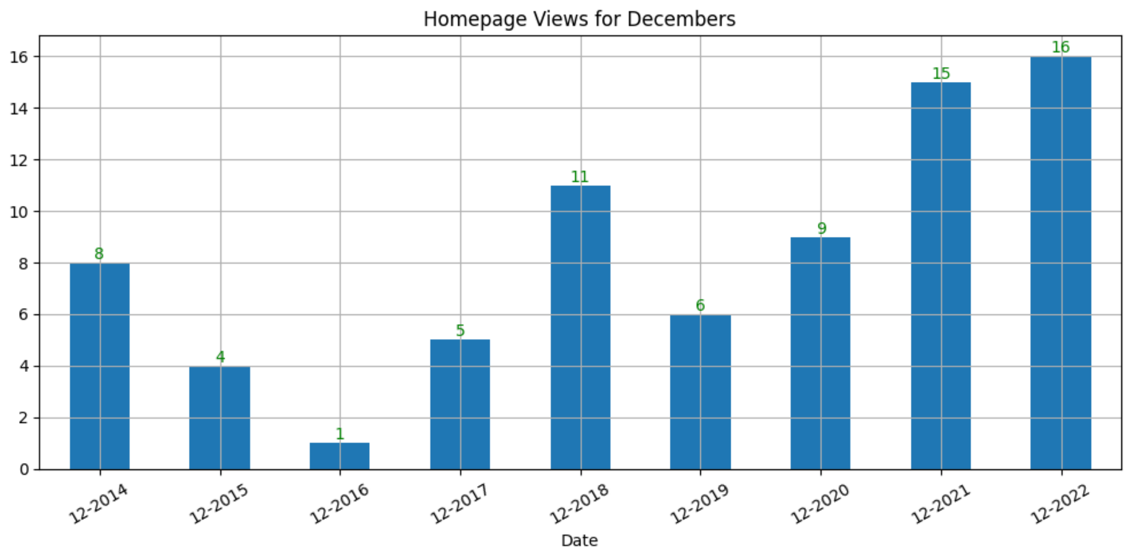


In [28]:

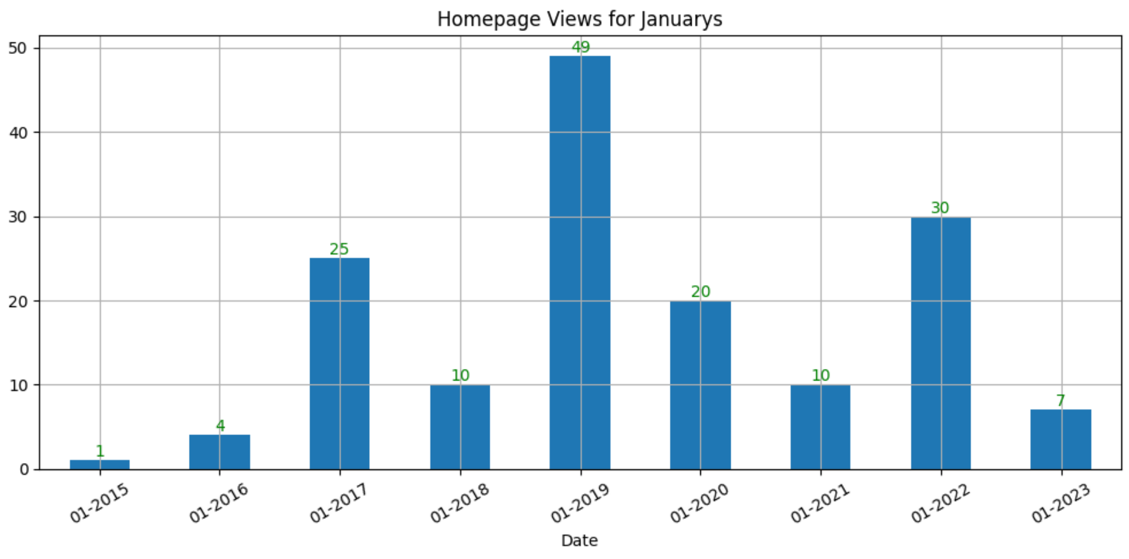
```
ax11 = novembers.plot(
        x="Formatted_Date",
        y="Views",
        figsize=(10,5),
        kind="bar",
        legend=False,
        grid=True,
        rot=30,
        xlabel="Date",
        title=f"Homepage Views for Novembers"
)

ax11.bar_label(ax11.containers[0], color="green")
plt.tight_layout()

plt.savefig("Homepage/novembers.png")
```



In [29]:
```
ax12 = decembers.plot(
        x="Formatted_Date",
        y="Views",
        figsize=(10,5),
        kind="bar",
        legend=False,
        grid=True,
        rot=30,
        xlabel="Date",
        title=f"Homepage Views for Decembers"
)

ax12.bar_label(ax12.containers[0], color="green")
plt.tight_layout()

plt.savefig("Homepage/decembers.png")
```

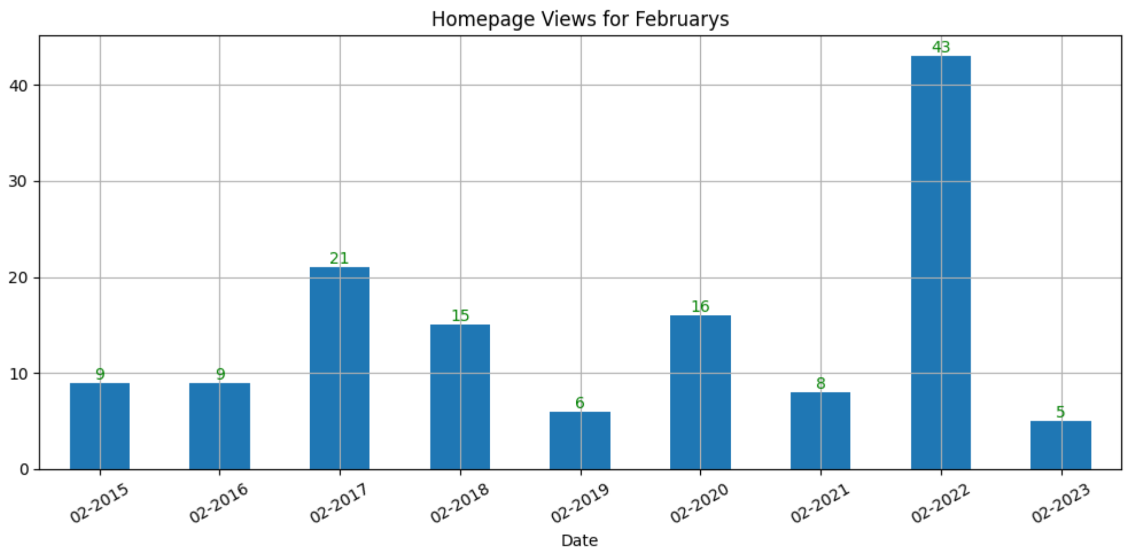


In [30]:
```
ax1 = januarys.plot(
        x="Formatted_Date",
        y="Views",
        figsize=(10,5),
        kind="bar",
        legend=False,
        grid=True,
        rot=30,
        xlabel="Date",
        title=f"Homepage Views for Januarys"
)

ax1.bar_label(ax1.containers[0], color="green")
plt.tight_layout()

plt.savefig("Homepage/januarys.png")
```

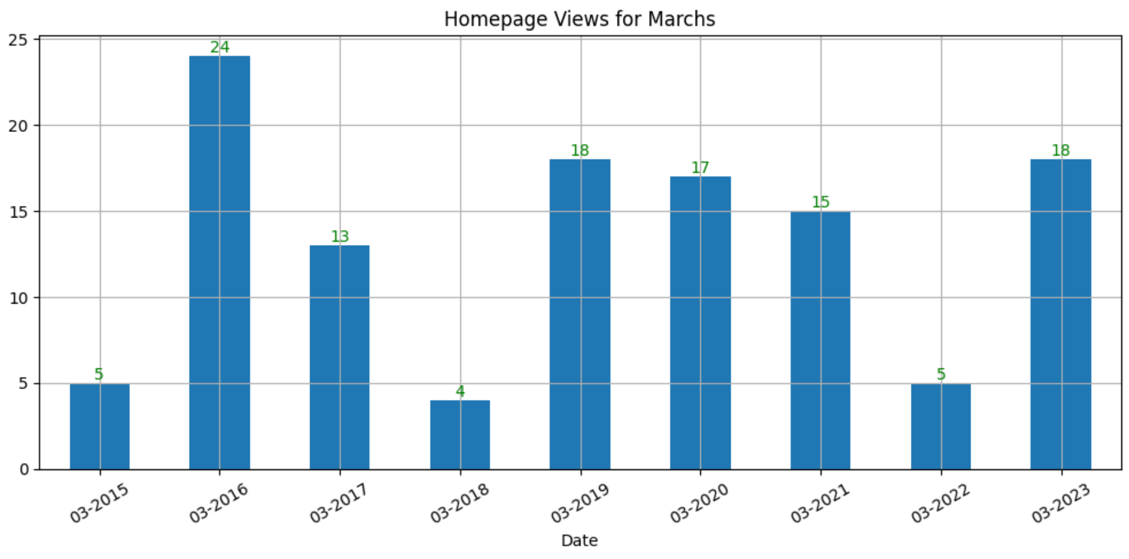


In [31]:

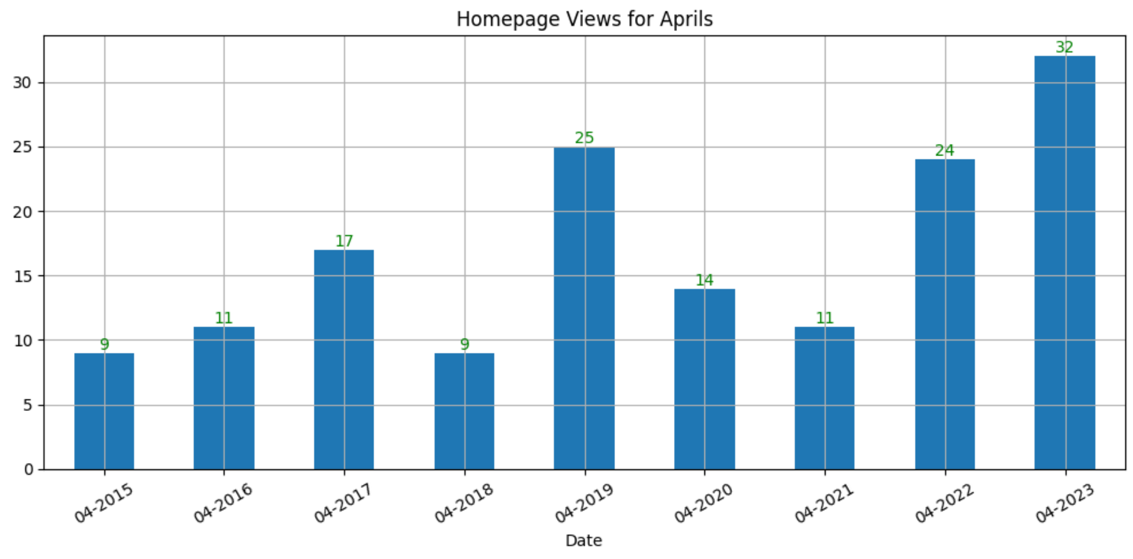
```
ax2 = februarys.plot(
        x="Formatted_Date",
        y="Views",
        figsize=(10,5),
        kind="bar",
        legend=False,
        grid=True,
        rot=30,
        xlabel="Date",
        title=f"Homepage Views for Februarys"
)

ax2.bar_label(ax2.containers[0], color="green")
plt.tight_layout()

plt.savefig("Homepage/februarys.png")
```



In [32]:
```
ax3= marchs.plot(
        x="Formatted_Date",
        y="Views",
        figsize=(10,5),
        kind="bar",
        legend=False,
        grid=True,
        rot=30,
        xlabel="Date",
        title=f"Homepage Views for Marchs"
)

ax3.bar_label(ax3.containers[0], color="green")
plt.tight_layout()

plt.savefig("Homepage/marchs.png")
```



In [33]:
```
ax4 = aprils.plot(
        x="Formatted_Date",
        y="Views",
        figsize=(10,5),
        kind="bar",
        legend=False,
        grid=True,
        rot=30,
        xlabel="Date",
        title=f"Homepage Views for Aprils"
)

ax4.bar_label(ax4.containers[0], color="green")
plt.tight_layout()

plt.savefig("Homepage/aprils.png")
```



Inferences

In [34]:
```
homepage_summer_bymonth["Month"] = homepage_summer_bymonth["Formatted_Date'
homepage_summer_bymonth = homepage_summer_bymonth.reset_index(drop=True)

homepage_summer_bymonth
```

Out[34]:

	Date	Views	Formatted_Date	Month
0	2015-05-01	2	05-2015	05
1	2016-05-01	10	05-2016	05
2	2017-05-01	7	05-2017	05
3	2018-05-01	4	05-2018	05
4	2019-05-01	10	05-2019	05
5	2020-05-01	40	05-2020	05
6	2021-05-01	9	05-2021	05
7	2022-05-01	15	05-2022	05
8	2015-06-01	2	06-2015	06
9	2016-06-01	5	06-2016	06
10	2017-06-01	10	06-2017	06
11	2018-06-01	15	06-2018	06
12	2019-06-01	5	06-2019	06
13	2020-06-01	15	06-2020	06
14	2021-06-01	15	06-2021	06
15	2022-06-01	12	06-2022	06
16	2014-07-01	4	07-2014	07
17	2015-07-01	0	07-2015	07
18	2016-07-01	7	07-2016	07
19	2017-07-01	9	07-2017	07
20	2018-07-01	3	07-2018	07
21	2019-07-01	7	07-2019	07
22	2020-07-01	32	07-2020	07
23	2021-07-01	57	07-2021	07
24	2022-07-01	31	07-2022	07

In [35]:
```
maxs = homepage_summer_bymonth.groupby(["Month"])["Views"].max()
maxs.name = "Max"
maxs
```

Out[35]:
```
Month
05    40
06    15
07    57
Name: Max, dtype: int64
```

In [36]:
```
mins = homepage_summer_bymonth.groupby(["Month"])["Views"].min()
mins.name = "Min"
mins
```

Out[36]:
```
Month
05    2
06    2
07    0
Name: Min, dtype: int64
```

In [37]:
```
last = homepage_summer_bymonth.loc[ (homepage_summer_bymonth["Formatted_Dat

last.name = "Last"
last.index = mins.index

last

# last.iloc[-1]
```

Out[37]:
```
Month
05    15
06    12
07    31
Name: Last, dtype: int64
```

In [38]:
```
summer_df = pd.concat([maxs, mins, last], axis=1)
summer_df
```

Out[38]:

	Max	Min	Last
Month			
05	40	2	15
06	15	2	12
07	57	0	31

In [39]:
```
summer_df["Max_to_Last_%Change"] = round((summer_df["Last"] - summer_df["Ma
summer_df
```

Out[39]:

	Max	Min	Last	Max_to_Last_%Change
Month				
05	40	2	15	-62.50
06	15	2	12	-20.00
07	57	0	31	-45.61

In [40]:
```
summer_df["Max_to_Min_%Change"] = round((summer_df["Min"] - summer_df["Max'
summer_df
```

Out[40]:

	Max	Min	Last	Max_to_Last_%Change	Max_to_Min_%Change
Month					
05	40	2	15	-62.50	-95.00
06	15	2	12	-20.00	-86.67
07	57	0	31	-45.61	-100.00

In [41]:
```
homepage_fall_bymonth["Month"] = homepage_fall_bymonth["Formatted_Date"].ap

homepage_fall_bymonth
```

Out[41]:

	Date	Views	Formatted_Date	Month
0	2014-08-01	21	08-2014	08
1	2015-08-01	10	08-2015	08
2	2016-08-01	11	08-2016	08
3	2017-08-01	96	08-2017	08
4	2018-08-01	44	08-2018	08
5	2019-08-01	8	08-2019	08
6	2020-08-01	15	08-2020	08
7	2021-08-01	10	08-2021	08
8	2022-08-01	20	08-2022	08
9	2014-09-01	28	09-2014	09
10	2015-09-01	17	09-2015	09
11	2016-09-01	37	09-2016	09
12	2017-09-01	51	09-2017	09
13	2018-09-01	79	09-2018	09
14	2019-09-01	42	09-2019	09
15	2020-09-01	53	09-2020	09
16	2021-09-01	28	09-2021	09
17	2022-09-01	13	09-2022	09
18	2014-10-01	15	10-2014	10
19	2015-10-01	6	10-2015	10
20	2016-10-01	21	10-2016	10
21	2017-10-01	18	10-2017	10
22	2018-10-01	34	10-2018	10
23	2019-10-01	31	10-2019	10
24	2020-10-01	14	10-2020	10
25	2021-10-01	38	10-2021	10
26	2022-10-01	12	10-2022	10
27	2014-11-01	4	11-2014	11
28	2015-11-01	15	11-2015	11
29	2016-11-01	13	11-2016	11
30	2017-11-01	15	11-2017	11
31	2018-11-01	18	11-2018	11
32	2019-11-01	13	11-2019	11
33	2020-11-01	27	11-2020	11
34	2021-11-01	11	11-2021	11

	Date	Views	Formatted_Date	Month
35	2022-11-01	12	11-2022	11
36	2014-12-01	8	12-2014	12
37	2015-12-01	4	12-2015	12
38	2016-12-01	1	12-2016	12
39	2017-12-01	5	12-2017	12
40	2018-12-01	11	12-2018	12
41	2019-12-01	6	12-2019	12
42	2020-12-01	9	12-2020	12
43	2021-12-01	15	12-2021	12
44	2022-12-01	16	12-2022	12

In [42]:
```
maxs = homepage_fall_bymonth.groupby(["Month"])["Views"].max()
maxs.name = "Max"
maxs
```

Out[42]:
```
Month
08    96
09    79
10    38
11    27
12    16
Name: Max, dtype: int64
```

In [43]:
```
mins = homepage_fall_bymonth.groupby(["Month"])["Views"].min()
mins.name = "Min"
mins
```

Out[43]:
```
Month
08     8
09    13
10     6
11     4
12     1
Name: Min, dtype: int64
```

In [44]:
```
last = homepage_fall_bymonth.loc[ (homepage_fall_bymonth["Formatted_Date"].

last.name = "Last"
last.index = mins.index

last

# last.iloc[-1]
```

Out[44]:
```
Month
08    20
09    13
10    12
11    12
12    16
Name: Last, dtype: int64
```

In [45]:
```
fall_df = pd.concat([maxs, mins, last], axis=1)
fall_df
```

Out[45]:

	Max	Min	Last
Month			
08	96	8	20
09	79	13	13
10	38	6	12
11	27	4	12
12	16	1	16

In [46]:
```
fall_df["Max_to_Last_%Change"] = round((fall_df["Last"] - fall_df["Max"]) /
fall_df
```

Out[46]:

	Max	Min	Last	Max_to_Last_%Change
Month				
08	96	8	20	-79.17
09	79	13	13	-83.54
10	38	6	12	-68.42
11	27	4	12	-55.56
12	16	1	16	0.00

In [47]:
```
fall_df["Max_to_Min_%Change"] = round((fall_df["Min"] - fall_df["Max"]) / f
fall_df
```

Out[47]:

Month	Max	Min	Last	Max_to_Last_%Change	Max_to_Min_%Change
08	96	8	20	-79.17	-91.67
09	79	13	13	-83.54	-83.54
10	38	6	12	-68.42	-84.21
11	27	4	12	-55.56	-85.19
12	16	1	16	0.00	-93.75

In [48]:
```
homepage_spring_bymonth["Month"] = homepage_spring_bymonth["Formatted_Date'

homepage_spring_bymonth
```

Out[48]:

	Date	Views	Formatted_Date	Month
0	2015-01-01	1	01-2015	01
1	2016-01-01	4	01-2016	01
2	2017-01-01	25	01-2017	01
3	2018-01-01	10	01-2018	01
4	2019-01-01	49	01-2019	01
5	2020-01-01	20	01-2020	01
6	2021-01-01	10	01-2021	01
7	2022-01-01	30	01-2022	01
8	2023-01-01	7	01-2023	01
9	2015-02-01	9	02-2015	02
10	2016-02-01	9	02-2016	02
11	2017-02-01	21	02-2017	02
12	2018-02-01	15	02-2018	02
13	2019-02-01	6	02-2019	02
14	2020-02-01	16	02-2020	02
15	2021-02-01	8	02-2021	02
16	2022-02-01	43	02-2022	02
17	2023-02-01	5	02-2023	02
18	2015-03-01	5	03-2015	03
19	2016-03-01	24	03-2016	03
20	2017-03-01	13	03-2017	03
21	2018-03-01	4	03-2018	03
22	2019-03-01	18	03-2019	03
23	2020-03-01	17	03-2020	03
24	2021-03-01	15	03-2021	03
25	2022-03-01	5	03-2022	03
26	2023-03-01	18	03-2023	03
27	2015-04-01	9	04-2015	04
28	2016-04-01	11	04-2016	04
29	2017-04-01	17	04-2017	04
30	2018-04-01	9	04-2018	04
31	2019-04-01	25	04-2019	04
32	2020-04-01	14	04-2020	04
33	2021-04-01	11	04-2021	04
34	2022-04-01	24	04-2022	04

	Date	Views	Formatted_Date	Month
35	2023-04-01	32	04-2023	04

In [49]:
```
maxs = homepage_spring_bymonth.groupby(["Month"])["Views"].max()
maxs.name = "Max"
maxs
```

Out[49]:
```
Month
01    49
02    43
03    24
04    32
Name: Max, dtype: int64
```

In [50]:
```
mins = homepage_spring_bymonth.groupby(["Month"])["Views"].min()
mins.name = "Min"
mins
```

Out[50]:
```
Month
01    1
02    5
03    4
04    9
Name: Min, dtype: int64
```

In [51]:
```
last = homepage_spring_bymonth.loc[ (homepage_spring_bymonth["Formatted_Dat

last.name = "Last"
last.index = mins.index

last

# last.iloc[-1]
```

Out[51]:
```
Month
01    30
02    43
03     5
04    24
Name: Last, dtype: int64
```

In [52]:
```
spring_df = pd.concat([maxs, mins, last], axis=1)
spring_df
```

Out[52]:

Month	Max	Min	Last
01	49	1	30
02	43	5	43
03	24	4	5
04	32	9	24

In [53]:
```
spring_df["Max_to_Last_%Change"] = round((spring_df["Last"] - spring_df["Ma
spring_df
```

Out[53]:

Month	Max	Min	Last	Max_to_Last_%Change
01	49	1	30	-38.78
02	43	5	43	0.00
03	24	4	5	-79.17
04	32	9	24	-25.00

In [54]:
```
spring_df["Max_to_Min_%Change"] = round((spring_df["Min"] - spring_df["Max"
spring_df
```

Out[54]:

Month	Max	Min	Last	Max_to_Last_%Change	Max_to_Min_%Change
01	49	1	30	-38.78	-97.96
02	43	5	43	0.00	-88.37
03	24	4	5	-79.17	-83.33
04	32	9	24	-25.00	-71.88

In [55]:
```
year_df = pd.concat([spring_df, summer_df, fall_df], axis=0)
year_df
```

Out[55]:

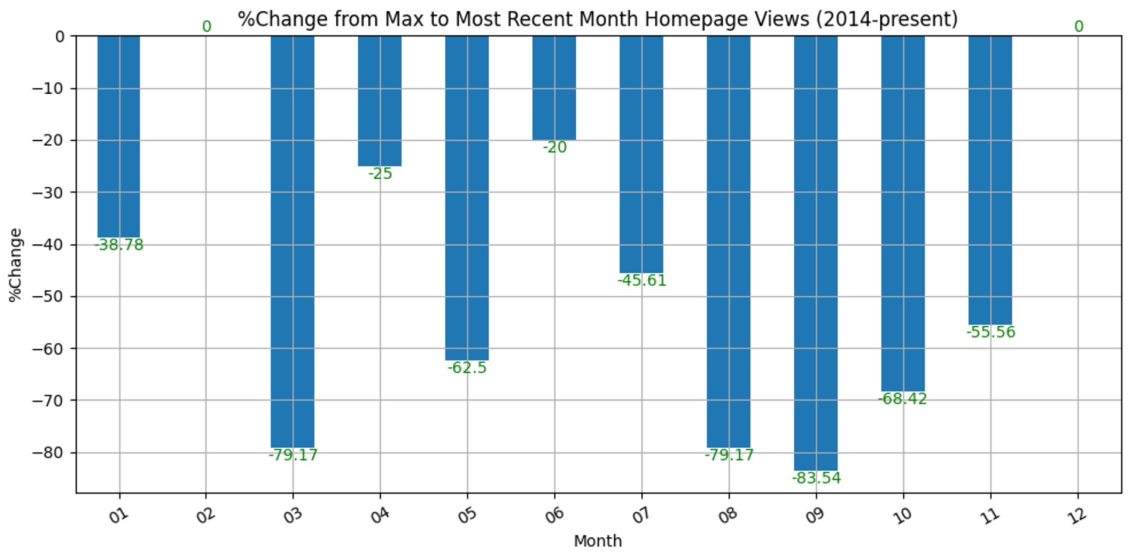
Month	Max	Min	Last	Max_to_Last_%Change	Max_to_Min_%Change
01	49	1	30	-38.78	-97.96
02	43	5	43	0.00	-88.37
03	24	4	5	-79.17	-83.33
04	32	9	24	-25.00	-71.88
05	40	2	15	-62.50	-95.00
06	15	2	12	-20.00	-86.67
07	57	0	31	-45.61	-100.00
08	96	8	20	-79.17	-91.67
09	79	13	13	-83.54	-83.54
10	38	6	12	-68.42	-84.21
11	27	4	12	-55.56	-85.19
12	16	1	16	0.00	-93.75

In [56]:
```
year_df.describe()
```

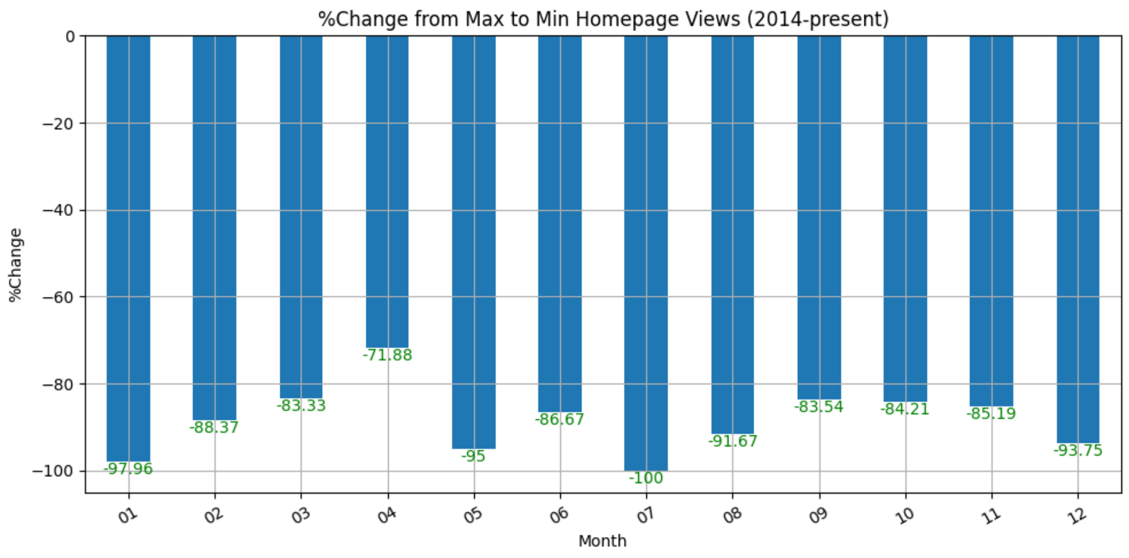
Out[56]:

	Max	Min	Last	Max_to_Last_%Change	Max_to_Min_%Change
count	12.000000	12.000000	12.000000	12.000000	12.000000
mean	43.000000	4.583333	19.416667	-46.479167	-88.464167
std	24.535688	3.872005	10.740394	29.961452	7.756924
min	15.000000	0.000000	5.000000	-83.540000	-100.000000
25%	26.250000	1.750000	12.000000	-71.107500	-94.062500
50%	39.000000	4.000000	15.500000	-50.585000	-87.520000
75%	51.000000	6.500000	25.500000	-23.750000	-84.042500
max	96.000000	13.000000	43.000000	0.000000	-71.880000

In [57]:
```
ax12_1 = year_df.plot(
        y="Max_to_Last_%Change",
        figsize=(10,5),
        kind="bar",
        legend=False,
        grid=True,
        rot=30,
        xlabel="Month",
        ylabel="%Change",
        title=f"%Change from Max to Most Recent Month Homepage Views (2014-
)

ax12_1.bar_label(ax12_1.containers[0], color="green")
plt.tight_layout()

plt.savefig("Homepage/homepage_max_to_most_recent.png")
```



In [58]:
```
ax12_2 = year_df.plot(
        y="Max_to_Min_%Change",
        figsize=(10,5),
        kind="bar",
        legend=False,
        grid=True,
        rot=30,
        xlabel="Month",
        ylabel="%Change",
        title=f"%Change from Max to Min Homepage Views (2014-present)"
)

ax12_2.bar_label(ax12_2.containers[0], color="green")
plt.tight_layout()

plt.savefig("Homepage/homepage_max_to_min.png")
```



In [59]:
```
print(f'Mean of homepage: {homepage_df_alltime["Views"].mean()}')
print(f'Median of homepage: {homepage_df_alltime["Views"].median()}')
print(f'Mode of homepage: {st.mode(homepage_df_alltime["Views"], axis=None,

print(f'Min of homepage: {homepage_df_alltime["Views"].min()}')
print(f'Max of homepage: {homepage_df_alltime["Views"].max()}')
```

```
Mean of homepage: 17.547169811320753
Median of homepage: 13.0
Mode of homepage: ModeResult(mode=15, count=11)
Min of homepage: 0
Max of homepage: 96
```