League of Legends

About this Dataset: League of Legends (LoL) is a 2009 multiplayer online battle arena video game developed and published by Riot Games.

In the game, two teams of five players battle in player versus player combat, each team occupying and defending their half of the map. Each of the ten players controls a character, known as a "champion", with unique abilities and differing styles of play. During a match, champions become more powerful by collecting experience points, earning gold, and purchasing items to defeat the opposing team. In the game's main mode, Summoner's Rift, a team wins by pushing through to the enemy base and destroying their "Nexus", a large structure located within [1].

Table Descriptions:

- `Name` : Name of the champion
- `Class` : Fighter, Assassin, Mage, Marksman, Support, or Tank
- `Role` : Top, Mid, ADC, Support, or Jungle
- `Tier` : S+, S, A, B, C, or D
- `Score` : Overall score of the champion
- `Trend` : Trend of the score
- `Win %` : Win rate of the champion
- `Role %` : Role rate played with the champion
- `Pick %` : Pick rate of the champion
- `Ban %` : Ban rate of the champion
- `KDA` : Kill/Death/Assist ratio of the champion (but in this dataset it will be (Kill+Assist)/Death)

Class Descriptions: [2]

- **Fighter:** Otherwise known as bruisers, fighters excel in close-combat, being able to deal tons of damage and take their fair share of it as well.
- **Assassin:** Also known as slayers are, by and afar, the class with the highest damage potency and mobility in the game. They excel at accessing priority targets and killing them efficiently, along with often getting themselves out of harms' way in the process.
- **Mage:** The most noteworthy trait of a mage is that they cast spells, often requiring large mana pools in order to do so effectively over the course of a fight. Very rarely do they rely on their basic attack, instead using spells to deal damage, lock enemies down, and secure objectives.
- **Marksman:** The signature trait of a marksman is their ability to deal damage primarily through basic attacks, with abilities often existing solely to enable such.
- **Controller:** They are champions whose primary job is to assist allies in securing kills and objectives. As a result, many of the champions in this category are typically played in the support role, occasionally flexing into the middle lane when needed.
- **Tank:** Tanks, while often lacking on the offensive front, are able to take plenty of hits and apply huge amounts of disabling crowd control effects. They excel at surviving burst damage, but often fall victim to onslaughts of consistent damage.

Lane/Role Descriptions: [3]

- **Top:** The Top Laner is assigned to the top lane. They need to have high survability, and high damage or engages.
- **Mid:** The Mid Laner is assigned to the middle lane. They need to have a high burst damage.
- **ADC (Bottom Lane):** The ADC (aka Bottom Carry) is assigned to the bottom lane, and is the most vulnerable. It's important that the champion aquires as much gold as possible to purchase key items that will greatly increase their fighting potential. They are highly dependant on item-based power spikes.
- **Support:** The Support is one of the two champions assigned to the ADC (bottom lane); their initial goal is to assist their more vulnerable team mate through the earliest stages of the game.
- **Jungle:** The Jungler is the champion assigned to the jungle. They need to be able to clear out jungle camps without too much difficulty and ambush other champions in lane.

Order of Tier & Score:

Tier	Score
S+	72.51 - 100.00
S	57.04 - 72.50
A	47.18 - 57.03
B	40.54 - 47.17
C	34.26 - 40.53
D	0.00 - 34.25

Other than the dataset and column description [4], as well as the description above, the tasks, descriptions under the tasks, and the summaries are all written and created by me.

In [10]:
```python
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sns

from scipy.stats import ttest_1samp, iqr, chi2_contingency, f_oneway
```

Patches for Season 12:

In [61]:
```python
#12.1

lol_1 = pd.read_csv('league_of_legends_12.1patch.csv')
lol_1.head()
```

Out[61]:

	Name	Class	Role	Tier	Score	Trend	Win %	Role %	Pick %	Ban %	KDA
0	Aatrox	Fighter	TOP	A	58.25	6.52	49.97%	94.62%	4.43%	2.03%	1.97

	Name	Class	Role	Tier	Score	Trend	Win %	Role %	Pick %	Ban %	KDA
1	Ahri	Mage	MID	A	53.21	-0.24	49.93%	93.47%	4.62%	1.04%	2.56
2	Akali	Assassin	MID	S	65.30	6.51	48.59%	65.65%	8.16%	12.88%	2.34
3	Akali	Assassin	TOP	A	57.87	3.34	48.57%	34.06%	4.24%	12.88%	2.04
4	Akshan	Marksman	MID	S	59.85	0.65	51.46%	58.01%	4.83%	21.91%	2.23

In [62]:

```python
#12.2

lol_2 = pd.read_csv('league_of_legends_12.2patch.csv')
lol_2.head()
```

Out[62]:

	Name	Class	Role	Tier	Score	Trend	Win %	Role %	Pick %	Ban %	KDA
0	Aatrox	Fighter	TOP	A	55.11	-3.14	48.97%	94.09%	4.33%	1.97%	1.92
1	Ahri	Mage	MID	A	55.85	2.64	50.71%	93.24%	4.56%	1.04%	2.55
2	Akali	Assassin	TOP	S+	87.73	29.87	49.70%	44.38%	6.19%	21.71%	2.13
3	Akali	Assassin	MID	S	74.58	9.28	49.85%	55.40%	8.26%	21.71%	2.42
4	Akshan	Marksman	MID	S	63.49	3.64	51.94%	59.70%	4.86%	23.10%	2.28

In [63]:

```python
#12.3

lol_3 = pd.read_csv('league_of_legends_12.3patch.csv')
lol_3.head()
```

Out[63]:

	Name	Class	Role	Tier	Score	Trend	Win %	Role %	Pick %	Ban %	KDA
0	Aatrox	Fighter	TOP	S	59.99	4.88	48.06%	92.58%	5.03%	2.15%	1.87
1	Ahri	Mage	MID	S+	95.22	39.37	53.40%	94.04%	15.29%	8.93%	2.59
2	Akali	Assassin	TOP	S	74.79	-12.94	48.48%	41.25%	5.10%	20.26%	2.08
3	Akali	Assassin	MID	S	64.77	-9.81	49.10%	58.10%	7.51%	20.26%	2.33
4	Akshan	Marksman	MID	A	54.42	-9.08	50.75%	59.43%	4.14%	18.73%	2.18

In [64]:

```python
#12.4

lol_4 = pd.read_csv('league_of_legends_12.4patch.csv')
lol_4.head()
```

Out[64]:

	Name	Class	Role	Tier	Score	Trend	Win %	Role %	Pick %	Ban %	KDA
0	Aatrox	Fighter	TOP	S+	78.29	18.31	50.10%	93.41%	7.38%	3.31%	1.94
1	Ahri	Mage	MID	S+	92.72	-2.50	51.62%	95.11%	13.98%	12.61%	2.54
2	Akali	Assassin	TOP	A	48.25	-26.55	48.07%	27.03%	3.21%	18.30%	2.03
3	Akali	Assassin	MID	S	73.23	8.46	49.98%	72.36%	9.31%	18.30%	2.32
4	Akshan	Marksman	MID	A	51.30	-3.12	49.25%	66.41%	4.44%	15.90%	2.14

Tasks:

1. Differences in Four Patches in Season 12:

1. What do the Classes, Roles, and Tiers look like?
2. Of all the champions, which one has the highest win %?
3. What is the Pick % to the Ban % for the Assassin Class?
4. What are the top 10 champions based on their Score, and what does the previous trends look like?
5. For the top 10 champions based on Score, what are their Win %, and their Ban %?
6. What proportion of champions are Marksman or Mage as a Mid Laner?
7. What proportion of champions are in Fighter or Collector and in Top Lane, have a Win % of 45% or more?

2. Champions in the Newest Patch (12.4):

1. Does Lux have a higher Win % in the Mid or Support Lane?
2. Of Akali's overall Pick %, which are in the Top Lane, and which are in the Mid Lane?
3. What is the Pick % of Alistar compared to his Ban %?
4. Of Akshan's overall Role %, what proportion is Top Lane and Mid Lane?
5. What does Ekko have a higher KDA in, Jungle Lane or Mid Lane?

3. Possibilites and Assumptions:

Use patch 12.4 to answer these questions.

1. We want to find the average KDA for all classes, and compare it to the average KDA of the Tank class.
2. Is there an association between roles and classes?
3. In the Support Lane, is it more likely for a Mage or Tank to be picked?
4. We want to see if the different types of classes: Fighter, Assassin, Mage, Marksman, Controller, Tank, is better than the others based on their scores.

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1. Differences Throughout the Four Patches in Season 12:

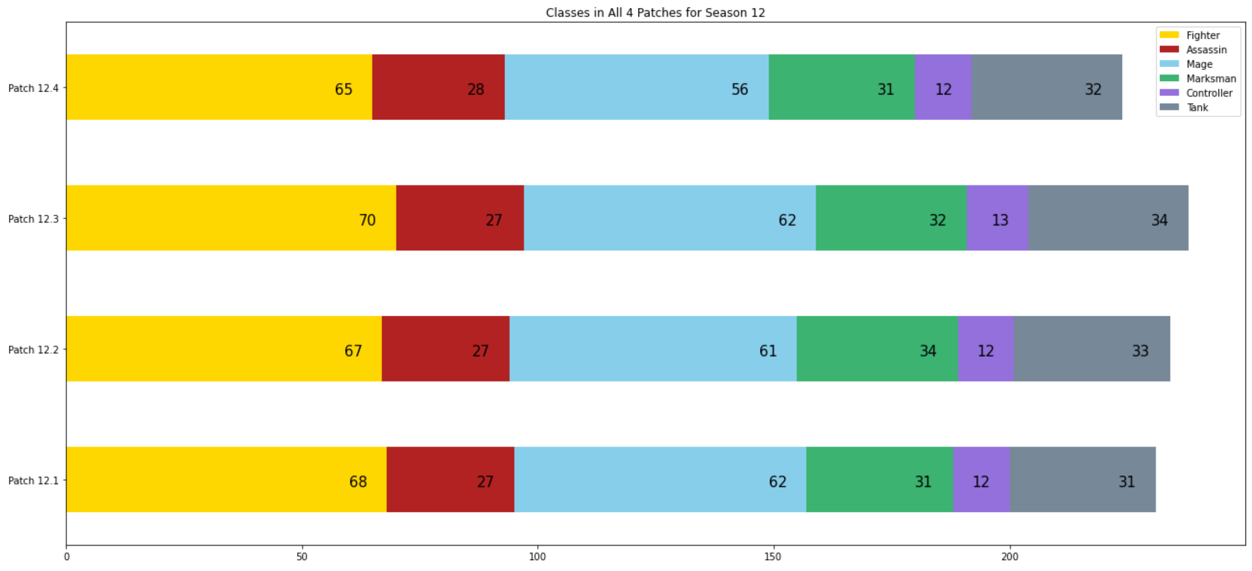
1.1 Classes, Roles, and Tiers

Starting out, we just want to see the breakdown of the classes, roles, and tiers throughout all four patches in season 12. Patch 12.4 is the most recent patch that has come out, with 12.3 as the next patch, and so on.

In [15]:

```python
lol_1_fighter = len(lol_1['Class'][lol_1['Class'] == "Fighter"])
lol_1_assassin = len(lol_1['Class'][lol_1['Class'] == "Assassin"])
lol_1_mage = len(lol_1['Class'][lol_1['Class'] == "Mage"])
lol_1_marksman = len(lol_1['Class'][lol_1['Class'] == "Marksman"])
lol_1_controller = len(lol_1['Class'][lol_1['Class'] == "Controller"])
lol_1_tank = len(lol_1['Class'][lol_1['Class'] == "Tank"])

lol_2_fighter = len(lol_2['Class'][lol_2['Class'] == "Fighter"])
lol_2_assassin = len(lol_2['Class'][lol_2['Class'] == "Assassin"])
lol_2_mage = len(lol_2['Class'][lol_2['Class'] == "Mage"])
lol_2_marksman = len(lol_2['Class'][lol_2['Class'] == "Marksman"])
lol_2_controller = len(lol_2['Class'][lol_2['Class'] == "Controller"])
lol_2_tank = len(lol_2['Class'][lol_2['Class'] == "Tank"])

lol_3_fighter = len(lol_3['Class'][lol_3['Class'] == "Fighter"])
lol_3_assassin = len(lol_3['Class'][lol_3['Class'] == "Assassin"])
```

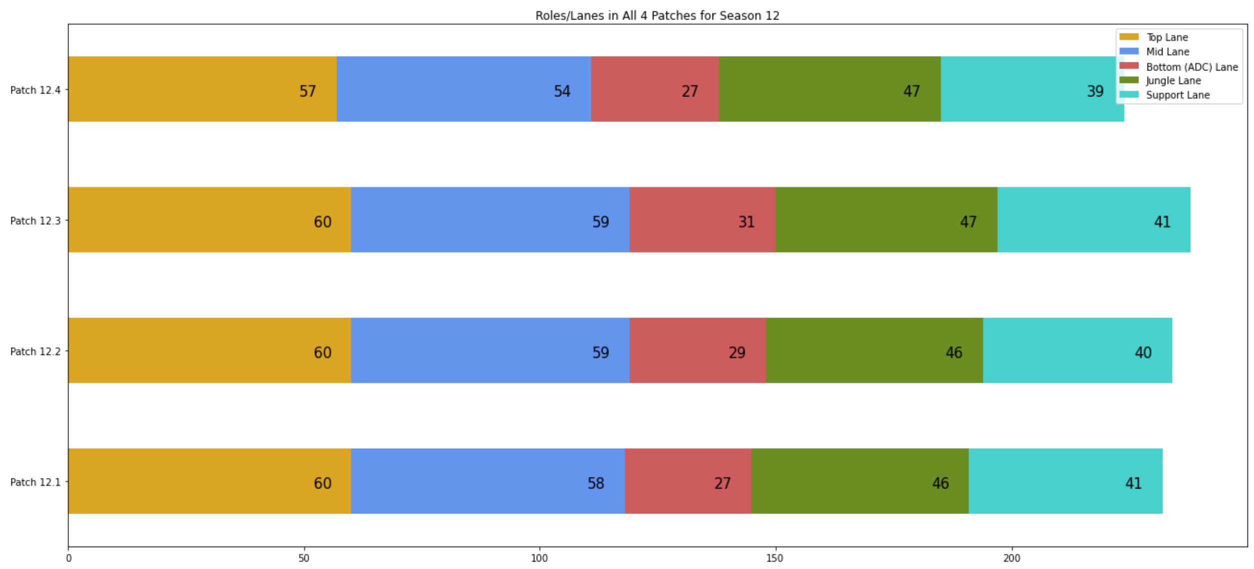
```
lol_3_mage = len(lol_3['Class'][lol_3['Class'] == "Mage"])
lol_3_marksman = len(lol_3['Class'][lol_3['Class'] == "Marksman"])
lol_3_controller = len(lol_3['Class'][lol_3['Class'] == "Controller"])
lol_3_tank = len(lol_3['Class'][lol_3['Class'] == "Tank"])

lol_4_fighter = len(lol_4['Class'][lol_4['Class'] == "Fighter"])
lol_4_assassin = len(lol_4['Class'][lol_4['Class'] == "Assassin"])
lol_4_mage = len(lol_4['Class'][lol_4['Class'] == "Mage"])
lol_4_marksman = len(lol_4['Class'][lol_4['Class'] == "Marksman"])
lol_4_controller = len(lol_4['Class'][lol_4['Class'] == "Controller"])
lol_4_tank = len(lol_4['Class'][lol_4['Class'] == "Tank"])


#-----------------------------------------------------------------------------------------

colors = ['gold', 'firebrick', 'skyblue', 'mediumseagreen', 'mediumpurple', 'lightslategray']

lol_class_df = pd.DataFrame({'Fighter': [lol_1_fighter, lol_2_fighter, lol_3_fighter, lol_4_fighter],
                             'Assassin': [lol_1_assassin, lol_2_assassin, lol_3_assassin, lol_4_assassin],
                             'Mage': [lol_1_mage, lol_2_mage, lol_3_mage, lol_4_mage],
                             'Marksman': [lol_1_marksman, lol_2_marksman, lol_3_marksman, lol_4_marksman],
                             'Controller': [lol_1_controller, lol_2_controller, lol_3_controller, lol_4_controller],
                             'Tank': [lol_1_tank, lol_2_tank, lol_3_tank, lol_4_tank]})
ax = lol_class_df.plot.barh(stacked = True, figsize = (22, 10), color = colors)

for rowNum,row in lol_class_df.iterrows():
    xpos = 0
    for val in row:
        xpos += val
        ax.text(xpos - 8, rowNum - 0.05, str(val), color='black', size = 15)
    xpos = 0

ax.set_title("Classes in All 4 Patches for Season 12")
ax.set_yticks(range(4))
ax.set_yticklabels(["Patch 12.1", "Patch 12.2", "Patch 12.3", "Patch 12.4"])

plt.savefig("all_classes_all_patches.png")
plt.show()
```



This graph just breaks down all the champion classes in the 4 patches in current season (Season 12).

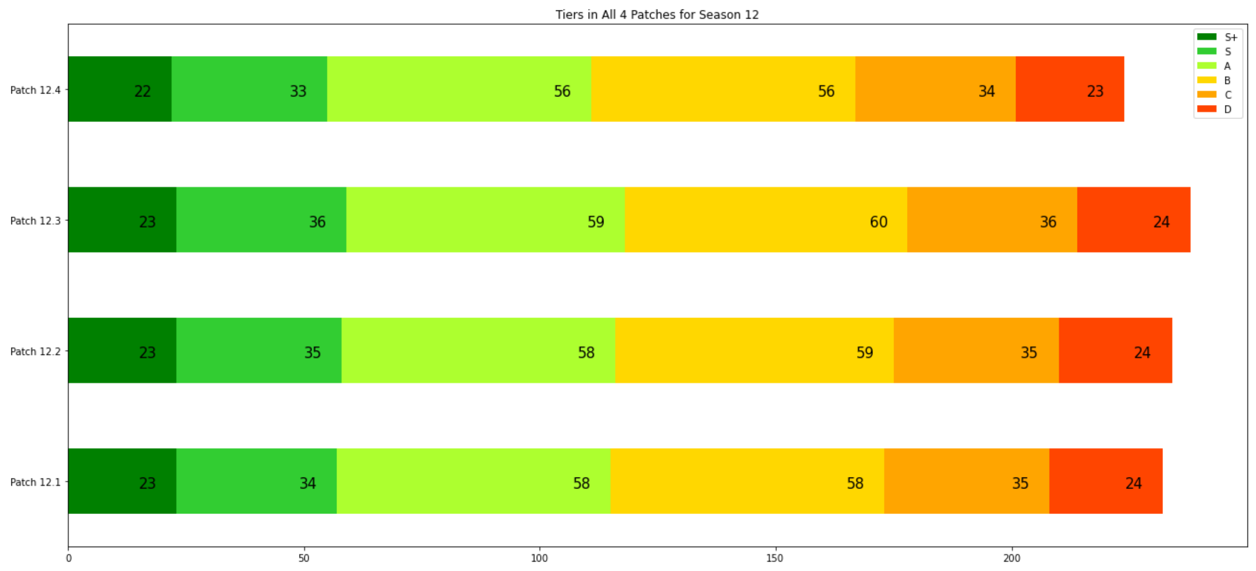
In [16]:

```
lol_1_top = len(lol_1['Role'][lol_1['Role'] == 'TOP'])
lol_1_mid = len(lol_1['Role'][lol_1['Role'] == 'MID'])
lol_1_adc = len(lol_1['Role'][lol_1['Role'] == 'ADC'])
lol_1_jungle = len(lol_1['Role'][lol_1['Role'] == 'JUNGLE'])
lol_1_support = len(lol_1['Role'][lol_1['Role'] == 'SUPPORT'])

lol_2_top = len(lol_2['Role'][lol_2['Role'] == 'TOP'])
lol_2_mid = len(lol_2['Role'][lol_2['Role'] == 'MID'])
lol_2_adc = len(lol_2['Role'][lol_2['Role'] == 'ADC'])
lol_2_jungle = len(lol_2['Role'][lol_2['Role'] == 'JUNGLE'])
lol_2_support = len(lol_2['Role'][lol_2['Role'] == 'SUPPORT'])

lol_3_top = len(lol_3['Role'][lol_3['Role'] == 'TOP'])
lol_3_mid = len(lol_3['Role'][lol_3['Role'] == 'MID'])
lol_3_adc = len(lol_3['Role'][lol_3['Role'] == 'ADC'])
lol_3_jungle = len(lol_3['Role'][lol_3['Role'] == 'JUNGLE'])
lol_3_support = len(lol_3['Role'][lol_3['Role'] == 'SUPPORT'])

lol_4_top = len(lol_4['Role'][lol_4['Role'] == 'TOP'])
lol_4_mid = len(lol_4['Role'][lol_4['Role'] == 'MID'])
lol_4_adc = len(lol_4['Role'][lol_4['Role'] == 'ADC'])
lol_4_jungle = len(lol_4['Role'][lol_4['Role'] == 'JUNGLE'])
lol_4_support = len(lol_4['Role'][lol_4['Role'] == 'SUPPORT'])


#-----------------------------------------------------------------------------------------

colors = ['goldenrod', 'cornflowerblue', 'indianred', 'olivedrab', 'mediumturquoise']

lol_roles_df = pd.DataFrame({'Top Lane': [lol_1_top, lol_2_top, lol_3_top, lol_4_top],
                             'Mid Lane': [lol_1_mid, lol_2_mid, lol_3_mid, lol_4_mid],
                             'Bottom (ADC) Lane': [lol_1_adc, lol_2_adc, lol_3_adc, lol_4_adc],
                             'Jungle Lane': [lol_1_jungle, lol_2_jungle, lol_3_jungle, lol_4_jungle],
                             'Support Lane': [lol_1_support, lol_2_support, lol_3_support, lol_4_support]})
ax = lol_roles_df.plot.barh(stacked = True, figsize = (22, 10), color = colors)

for rowNum,row in lol_roles_df.iterrows():
    xpos = 0
    for val in row:
        xpos += val
        ax.text(xpos - 8, rowNum - 0.05, str(val), color='black', size = 15)
    xpos = 0

ax.set_title("Roles/Lanes in All 4 Patches for Season 12")
ax.set_yticks(range(4))
ax.set_yticklabels(["Patch 12.1", "Patch 12.2", "Patch 12.3", "Patch 12.4"])

plt.savefig("all_roles_all_patches.png")
plt.show()
```



This graph just breaks down the different roles/lanes in all four patches in the current season (Season 12).

In [17]:
```python
lol_1_splus = len(lol_1['Tier'][lol_1['Tier'] == 'S+'])
lol_1_s = len(lol_1['Tier'][lol_1['Tier'] == 'S'])
lol_1_a = len(lol_1['Tier'][lol_1['Tier'] == 'A'])
lol_1_b = len(lol_1['Tier'][lol_1['Tier'] == 'B'])
lol_1_c = len(lol_1['Tier'][lol_1['Tier'] == 'C'])
lol_1_d = len(lol_1['Tier'][lol_1['Tier'] == 'D'])

lol_2_splus = len(lol_2['Tier'][lol_2['Tier'] == 'S+'])
lol_2_s = len(lol_2['Tier'][lol_2['Tier'] == 'S'])
lol_2_a = len(lol_2['Tier'][lol_2['Tier'] == 'A'])
lol_2_b = len(lol_2['Tier'][lol_2['Tier'] == 'B'])
lol_2_c = len(lol_2['Tier'][lol_2['Tier'] == 'C'])
lol_2_d = len(lol_2['Tier'][lol_2['Tier'] == 'D'])

lol_3_splus = len(lol_3['Tier'][lol_3['Tier'] == 'S+'])
lol_3_s = len(lol_3['Tier'][lol_3['Tier'] == 'S'])
lol_3_a = len(lol_3['Tier'][lol_3['Tier'] == 'A'])
lol_3_b = len(lol_3['Tier'][lol_3['Tier'] == 'B'])
lol_3_c = len(lol_3['Tier'][lol_3['Tier'] == 'C'])
lol_3_d = len(lol_3['Tier'][lol_3['Tier'] == 'D'])

lol_4_splus = len(lol_4['Tier'][lol_4['Tier'] == 'S+'])
lol_4_s = len(lol_4['Tier'][lol_4['Tier'] == 'S'])
lol_4_a = len(lol_4['Tier'][lol_4['Tier'] == 'A'])
lol_4_b = len(lol_4['Tier'][lol_4['Tier'] == 'B'])
lol_4_c = len(lol_4['Tier'][lol_4['Tier'] == 'C'])
lol_4_d = len(lol_4['Tier'][lol_4['Tier'] == 'D'])


#---------------------------------------------------------------------------------------------

colors = ['green', 'limegreen', 'greenyellow', 'gold', 'orange', 'orangered']

lol_tiers_df = pd.DataFrame({'S+': [lol_1_splus, lol_2_splus, lol_3_splus, lol_4_splus],
                             'S': [lol_1_s, lol_2_s, lol_3_s, lol_4_s],
                             'A': [lol_1_a, lol_2_a, lol_3_a, lol_4_a],
                             'B': [lol_1_b, lol_2_b, lol_3_b, lol_4_b],
                             'C': [lol_1_c, lol_2_c, lol_3_c, lol_4_c],
                             'D': [lol_1_d, lol_2_d, lol_3_d, lol_4_d]})
ax = lol_tiers_df.plot.barh(stacked = True, figsize = (22, 10), color = colors)

for rowNum,row in lol_tiers_df.iterrows():
    xpos = 0
    for val in row:
        xpos += val
        ax.text(xpos - 8, rowNum - 0.05, str(val), color='black', size = 15)
    xpos = 0

ax.set_title("Tiers in All 4 Patches for Season 12")
ax.set_yticks(range(4))
ax.set_yticklabels(["Patch 12.1", "Patch 12.2", "Patch 12.3", "Patch 12.4"])


plt.savefig("all_tiers_all_patches.png")
plt.show()
```



This graph shows that all champions are divided somewhat equally by tier (which is determined by score) to give all the players a more equal setting between champions. It will be likely that in the next patch, most of the S+ tier will move down to the lower tiers like B, or C; while the lower tiers will move up to the higher tiers.

Return to Tasks

1.2 Which Champion Has the Highest Win %?

In [18]:
```
lol_1['Win %'] = lol_1['Win %'].str.rstrip('%').astype('float') / 100
lol_2['Win %'] = lol_2['Win %'].str.rstrip('%').astype('float') / 100
lol_3['Win %'] = lol_3['Win %'].str.rstrip('%').astype('float') / 100
lol_4['Win %'] = lol_4['Win %'].str.rstrip('%').astype('float') / 100
```

In [19]:
```
sorted_lol_1 = lol_1.sort_values('Win %', ascending = False)
#sorted_lol_1.head(10)

lol_1_champion_win = sorted_lol_1[sorted_lol_1['Win %'] >= 0.5]
lol_1_champion_win = lol_1_champion_win.dropna()
lol_1_champion_win = lol_1_champion_win.drop_duplicates(subset = ['Name'])

lol_1_champion_win.head()
```

Out[19]:

	Name	Class	Role	Tier	Score	Trend	Win %	Role %	Pick %	Ban %	KDA
86	Kled	Fighter	MID	A	48.84	0.00	0.5514	10.23%	0.19%	0.83%	2.70
74	Karthus	Mage	ADC	B	42.26	-1.65	0.5498	21.05%	0.95%	3.30%	2.23
228	Zilean	Controller	MID	A	52.20	1.35	0.5419	14.12%	0.56%	1.40%	3.46
149	Seraphine	Mage	ADC	B	45.21	5.14	0.5415	16.88%	0.71%	1.03%	3.07
172	Taliyah	Mage	SUPPORT	B	42.40	2.15	0.5360	15.08%	0.26%	0.18%	2.10

In [20]:
```
sorted_lol_2 = lol_2.sort_values('Win %', ascending = False)
#sorted_lol_2.head(10)

lol_2_champion_win = sorted_lol_2[sorted_lol_2['Win %'] >= 0.5]
lol_2_champion_win = lol_2_champion_win.dropna()
lol_2_champion_win = lol_2_champion_win.drop_duplicates(subset = ['Name'])

lol_2_champion_win.head()
```

Out[20]:

	Name	Class	Role	Tier	Score	Trend	Win %	Role %	Pick %	Ban %	KDA
171	Tahm Kench	Tank	ADC	B	45.89	0.00	0.5476	13.21%	0.43%	10.32%	2.97
147	Senna	Marksman	ADC	A	57.00	20.70	0.5464	31.10%	4.81%	7.43%	3.05
73	Karthus	Mage	ADC	B	39.39	-2.87	0.5361	17.97%	0.75%	2.84%	2.25
195	Veigar	Mage	ADC	B	43.25	6.96	0.5347	17.97%	1.69%	2.91%	2.55
164	Swain	Mage	ADC	B	42.20	0.87	0.5342	19.62%	0.44%	1.61%	2.86

In [21]:
```
sorted_lol_3 = lol_3.sort_values('Win %', ascending = False)
#sorted_lol_3.head(10)

lol_3_champion_win = sorted_lol_3[sorted_lol_3['Win %'] >= 0.5]
lol_3_champion_win = lol_3_champion_win.dropna()
lol_3_champion_win = lol_3_champion_win.drop_duplicates(subset = ['Name'])

lol_3_champion_win.head()
```

Out[21]:

	Name	Class	Role	Tier	Score	Trend	Win %	Role %	Pick %	Ban %	KDA
177	Tahm Kench	Tank	ADC	A	53.19	7.30	0.5560	10.73%	0.32%	5.73%	3.07
88	Kled	Fighter	MID	A	49.38	0.00	0.5482	10.14%	0.18%	0.80%	2.63
84	Kennen	Mage	MID	A	48.42	9.35	0.5427	16.84%	0.33%	0.50%	2.54
201	Veigar	Mage	ADC	A	50.31	7.06	0.5425	19.56%	2.02%	5.09%	2.57
167	Skarner	Fighter	JUNGLE	A	48.07	7.45	0.5422	76.62%	0.75%	0.13%	2.96

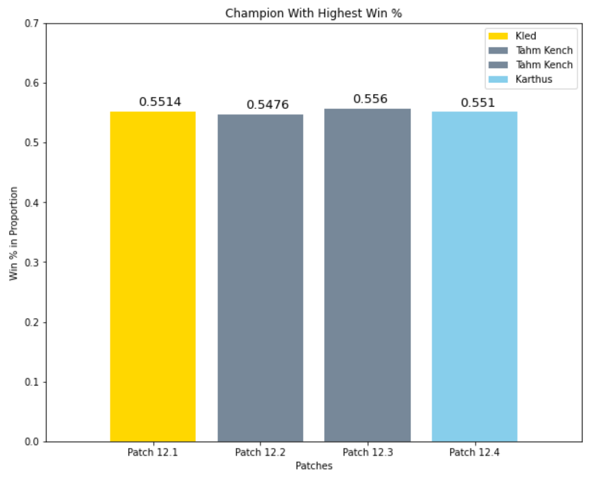
In [22]:
```
sorted_lol_4 = lol_4.sort_values('Win %', ascending = False)
#sorted_lol_4.head(10)

lol_4_champion_win = sorted_lol_4[sorted_lol_4['Win %'] >= 0.5]
lol_4_champion_win = lol_4_champion_win.dropna()
lol_4_champion_win = lol_4_champion_win.drop_duplicates(subset = ['Name'])

lol_4_champion_win.head()
```

Out[22]:

	Name	Class	Role	Tier	Score	Trend	Win %	Role %	Pick %	Ban %	KDA
70	Karthus	Mage	ADC	B	46.53	4.32	0.5510	18.40%	0.64%	2.02%	2.29

	Name	Class	Role	Tier	Score	Trend	Win %	Role %	Pick %	Ban %	KDA
188	Veigar	Mage	ADC	B	46.70	-3.61	0.5381	13.10%	1.36%	6.66%	2.51
197	Volibear	Fighter	JUNGLE	A	54.59	5.28	0.5326	52.30%	3.59%	2.07%	2.70
100	Miss Fortune	Marksman	ADC	A	55.09	6.16	0.5307	94.67%	7.95%	1.86%	2.29
107	Neeko	Mage	MID	A	52.38	12.02	0.5306	68.27%	2.65%	0.54%	2.41

In [23]:
```python
lol_1_champion_win_legend = lol_1_champion_win['Name'].iloc[0]
lol_1_champion_win_y = lol_1_champion_win['Win %'].iloc[0]
#print(lol_1_champion_win_legend)
#print(lol_1_champion_win_y)

lol_2_champion_win_legend = lol_2_champion_win['Name'].iloc[0]
lol_2_champion_win_y = lol_2_champion_win['Win %'].iloc[0]
#print(lol_2_champion_win_legend)
#print(lol_2_champion_win_y)

lol_3_champion_win_legend = lol_3_champion_win['Name'].iloc[0]
lol_3_champion_win_y = lol_3_champion_win['Win %'].iloc[0]
#print(lol_3_champion_win_legend)
#print(lol_3_champion_win_y)

lol_4_champion_win_legend = lol_4_champion_win['Name'].iloc[0]
lol_4_champion_win_y = lol_4_champion_win['Win %'].iloc[0]
#print(lol_4_champion_win_legend)
#print(lol_4_champion_win_y)

lol_champion_win_y = []
lol_champion_win_y.append(lol_1_champion_win_y)
lol_champion_win_y.append(lol_2_champion_win_y)
lol_champion_win_y.append(lol_3_champion_win_y)
lol_champion_win_y.append(lol_4_champion_win_y)

lol_champion_win_legend = []
lol_champion_win_legend.append(lol_1_champion_win_legend)
lol_champion_win_legend.append(lol_2_champion_win_legend)
lol_champion_win_legend.append(lol_3_champion_win_legend)
lol_champion_win_legend.append(lol_4_champion_win_legend)


plt.figure(figsize = (10, 8))
ax = plt.subplot()

colors = ['gold', 'lightslategray', 'lightslategray', 'skyblue']

i = 0
for bar, label, color in zip(lol_champion_win_y, lol_champion_win_legend, colors):
    plt.bar(i, bar, label = label, color = color)
    i += 1

for i, v in enumerate(lol_champion_win_y):
    ax.text(i - 0.14, v + 0.01, str(v), size = 13)

plt.axis([-1, 4, 0, 0.7])
ax.set_xticks(range(4))
ax.set_xticklabels(['Patch 12.1', 'Patch 12.2', 'Patch 12.3', 'Patch 12.4'])
ax.set_title("Champion With Highest Win %")
plt.xlabel("Patches")
plt.ylabel("Win % in Proportion")

plt.legend()

plt.savefig("champion_highest_win_all_patches.png")
plt.show()
```



As you can see from this graph, in patches 12.2 and 12.3, Tahm Kench was the champion with the highest win rate, but was fixed in patch 12.4.

Return to Tasks

1.3 Pick % to Ban % in the Assassin Class?

In [24]:
```python
lol_1['Pick %'] = lol_1['Pick %'].str.rstrip('%').astype('float') / 100
lol_2['Pick %'] = lol_2['Pick %'].str.rstrip('%').astype('float') / 100
lol_3['Pick %'] = lol_3['Pick %'].str.rstrip('%').astype('float') / 100
lol_4['Pick %'] = lol_4['Pick %'].str.rstrip('%').astype('float') / 100

lol_1['Ban %'] = lol_1['Ban %'].str.rstrip('%').astype('float') / 100
lol_2['Ban %'] = lol_2['Ban %'].str.rstrip('%').astype('float') / 100
lol_3['Ban %'] = lol_3['Ban %'].str.rstrip('%').astype('float') / 100
lol_4['Ban %'] = lol_4['Ban %'].str.rstrip('%').astype('float') / 100
```

In [25]:
```python
lol_1_pick_ban_assassin = lol_1[lol_1['Class'] == 'Assassin']
lol_1_pick_ban_assassin = lol_1_pick_ban_assassin.dropna()
lol_1_pick_ban_assassin = lol_1_pick_ban_assassin.drop_duplicates()

lol_1_pick_ban_assassin.head()
```

Out[25]:

	Name	Class	Role	Tier	Score	Trend	Win %	Role %	Pick %	Ban %	KDA
2	Akali	Assassin	MID	S	65.30	6.51	0.4859	65.65%	0.0816	0.1288	2.34

	Name	Class	Role	Tier	Score	Trend	Win %	Role %	Pick %	Ban %	KDA
3	Akali	Assassin	TOP	A	57.87	3.34	0.4857	34.06%	0.0424	0.1288	2.04
33	Ekko	Assassin	JUNGLE	A	55.93	-1.56	0.4991	64.39%	0.0616	0.0409	2.74
34	Ekko	Assassin	MID	A	46.78	0.91	0.4967	33.37%	0.0326	0.0409	2.24
36	Evelynn	Assassin	JUNGLE	A	48.04	-1.54	0.4964	98.86%	0.0346	0.0885	2.94

In [26]:

```
lol_2_pick_ban_assassin = lol_2[lol_2['Class'] == 'Assassin']
lol_2_pick_ban_assassin = lol_2_pick_ban_assassin.dropna()
lol_2_pick_ban_assassin = lol_2_pick_ban_assassin.drop_duplicates()

lol_2_pick_ban_assassin.head()
```

Out[26]:

	Name	Class	Role	Tier	Score	Trend	Win %	Role %	Pick %	Ban %	KDA
2	Akali	Assassin	TOP	S+	87.73	29.87	0.4970	44.38%	0.0619	0.2171	2.13
3	Akali	Assassin	MID	S	74.58	9.28	0.4985	55.40%	0.0826	0.2171	2.42
33	Ekko	Assassin	JUNGLE	A	57.22	1.29	0.5044	64.85%	0.0617	0.0399	2.74
34	Ekko	Assassin	MID	A	49.04	2.26	0.5064	33.14%	0.0303	0.0399	2.29
36	Evelynn	Assassin	JUNGLE	A	47.98	-0.06	0.5007	98.88%	0.0335	0.0833	2.92

In [27]:

```
lol_3_pick_ban_assassin = lol_3[lol_3['Class'] == 'Assassin']
lol_3_pick_ban_assassin = lol_3_pick_ban_assassin.dropna()
lol_3_pick_ban_assassin = lol_3_pick_ban_assassin.drop_duplicates()

lol_3_pick_ban_assassin.head()
```

Out[27]:

	Name	Class	Role	Tier	Score	Trend	Win %	Role %	Pick %	Ban %	KDA
2	Akali	Assassin	TOP	S	74.79	-12.94	0.4848	41.25%	0.0510	0.2026	2.08
3	Akali	Assassin	MID	S	64.77	-9.81	0.4910	58.10%	0.0751	0.2026	2.33
35	Ekko	Assassin	JUNGLE	A	54.49	-2.72	0.5047	65.25%	0.0549	0.0351	2.69
36	Ekko	Assassin	MID	B	45.95	-3.09	0.4976	32.09%	0.0262	0.0351	2.23
38	Evelynn	Assassin	JUNGLE	B	43.12	-4.87	0.4782	98.21%	0.0352	0.0723	2.78

In [28]:

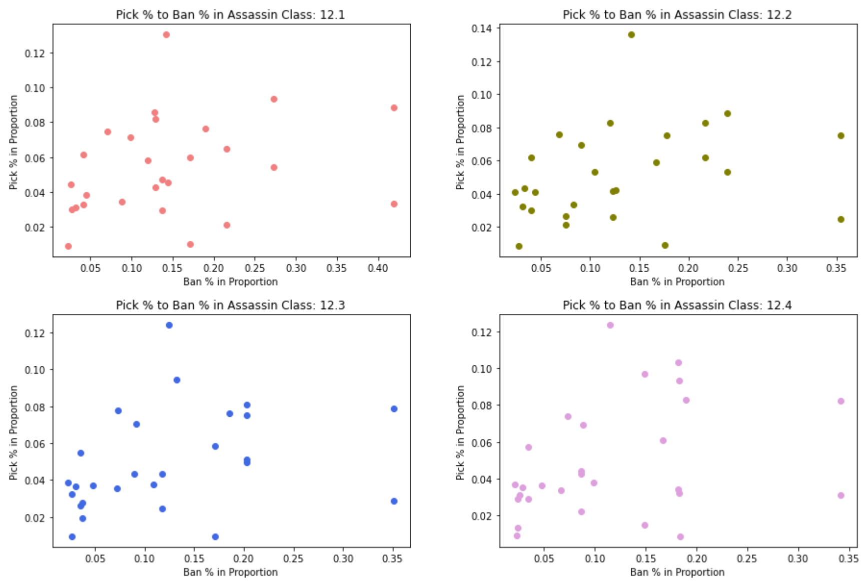
```
lol_4_pick_ban_assassin = lol_4[lol_4['Class'] == 'Assassin']
lol_4_pick_ban_assassin = lol_4_pick_ban_assassin.dropna()
lol_4_pick_ban_assassin = lol_4_pick_ban_assassin.drop_duplicates()

lol_4_pick_ban_assassin.head()
```

Out[28]:

	Name	Class	Role	Tier	Score	Trend	Win %	Role %	Pick %	Ban %	KDA
2	Akali	Assassin	TOP	A	48.25	-26.55	0.4807	27.03%	0.0321	0.1830	2.03
3	Akali	Assassin	MID	S	73.23	8.46	0.4998	72.36%	0.0931	0.1830	2.32
33	Ekko	Assassin	JUNGLE	S	59.62	5.13	0.5195	64.38%	0.0570	0.0346	2.76
34	Ekko	Assassin	MID	A	47.82	1.87	0.5066	33.84%	0.0290	0.0346	2.30
36	Evelynn	Assassin	JUNGLE	B	42.86	-0.26	0.4827	98.73%	0.0335	0.0668	2.69

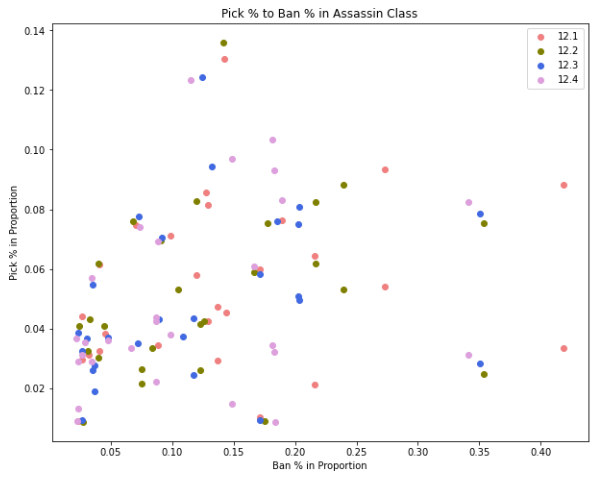
In [29]:

```
x1 = lol_1_pick_ban_assassin['Ban %']
y1 = lol_1_pick_ban_assassin['Pick %']

x2 = lol_2_pick_ban_assassin['Ban %']
y2 = lol_2_pick_ban_assassin['Pick %']

x3 = lol_3_pick_ban_assassin['Ban %']
y3 = lol_3_pick_ban_assassin['Pick %']

x4 = lol_4_pick_ban_assassin['Ban %']
y4 = lol_4_pick_ban_assassin['Pick %']


plt.figure(figsize = (15, 10))
plt.subplot(2, 2, 1)
plt.scatter(x1, y1, color = 'lightcoral')
plt.title("Pick % to Ban % in Assassin Class: 12.1")
plt.xlabel("Ban % in Proportion")
plt.ylabel("Pick % in Proportion")

plt.subplot(2, 2, 2)
plt.scatter(x2, y2, color = 'olive')
plt.title("Pick % to Ban % in Assassin Class: 12.2")
plt.xlabel("Ban % in Proportion")
plt.ylabel("Pick % in Proportion")

plt.subplot(2, 2, 3)
plt.scatter(x3, y3, color = 'royalblue')
plt.title("Pick % to Ban % in Assassin Class: 12.3")
plt.xlabel("Ban % in Proportion")
plt.ylabel("Pick % in Proportion")

plt.subplot(2, 2, 4)
plt.scatter(x4, y4, color = 'plum')
plt.title("Pick % to Ban % in Assassin Class: 12.4")
plt.xlabel("Ban % in Proportion")
plt.ylabel("Pick % in Proportion")

plt.subplots_adjust(wspace = 0.25, hspace = 0.25)

plt.savefig("pick_ban_assassin_separate_patches.png")
plt.show()
```



Each of the graphs with each patch looks pretty similar to each other. You will see that there is a higher Ban % than there is a Pick % for the Assassin class.

In [30]:
```python
x = []
x.append(x1)
x.append(x2)
x.append(x3)
x.append(x4)

y = []
y.append(y1)
y.append(y2)
y.append(y3)
y.append(y4)

colors = ['lightcoral', 'olive', 'royalblue', 'plum']

plt.figure(figsize = (10, 8))

for ban, pick, color in zip(x, y, colors):
    plt.scatter(ban, pick, color = color)

plt.title("Pick % to Ban % in Assassin Class")
plt.xlabel("Ban % in Proportion")
plt.ylabel("Pick % in Proportion")
plt.legend(['12.1', '12.2', '12.3', '12.4'])

plt.savefig("pick_ban_assassin_all_patches.png")
plt.show()
```



Combining all 4 of the previous graphs into one show that there are many more Assassin champions that are banned more than picked; and that there is a somewhat positive correlation between Pick % and Ban % in the Assassin class.

Return to Tasks

1.4 Top 10 Champions Based on Score and Trends

In [31]:
```python
sorted_lol_1_score = lol_1.sort_values('Score', ascending = False)
#sorted_lol_1_score.head(10)

lol_1_top_score = sorted_lol_1_score[sorted_lol_1_score['Score'] >= 85]
lol_1_top_score = lol_1_top_score.dropna()
lol_1_top_score = lol_1_top_score.drop_duplicates(subset = ['Name'])

lol_1_top_score.head(10)
```

Out[31]:

	Name	Class	Role	Tier	Score	Trend	Win %	Role %	Pick %	Ban %	KDA
69	Jhin	Marksman	ADC	S+	94.23	3.23	0.5103	99.02%	0.2455	0.0581	3.01
96	Lulu	Controller	SUPPORT	S+	93.56	0.75	0.5084	97.72%	0.1430	0.2568	3.12
90	Lee Sin	Fighter	JUNGLE	S+	91.89	0.28	0.4845	96.61%	0.1529	0.1626	2.82
171	Tahm Kench	Tank	TOP	S+	91.80	21.07	0.5128	92.57%	0.0648	0.1624	2.60
224	Zed	Assassin	MID	S+	90.50	-0.27	0.5087	67.21%	0.0884	0.4188	2.31
152	Sett	Fighter	TOP	S+	90.23	15.56	0.4960	83.89%	0.0823	0.0737	1.76
21	Caitlyn	Marksman	ADC	S+	88.48	-0.16	0.5009	98.70%	0.2130	0.1896	2.31

	Name	Class	Role	Tier	Score	Trend	Win %	Role %	Pick %	Ban %	KDA
155	Shen	Tank	TOP	S+	88.45	20.45	0.5274	87.85%	0.0634	0.0206	2.98
70	Jinx	Marksman	ADC	S+	86.76	-1.22	0.5132	99.51%	0.2227	0.0698	2.43
216	Yasuo	Fighter	MID	S+	86.16	-0.04	0.4956	71.44%	0.1177	0.2441	1.74

In [32]:

```
sorted_lol_2_score = lol_2.sort_values('Score', ascending = False)
#sorted_lol_2_score.head(10)

lol_2_top_score = sorted_lol_2_score[sorted_lol_2_score['Score'] >= 85]
lol_2_top_score = lol_2_top_score.dropna()
lol_2_top_score = lol_2_top_score.drop_duplicates(subset = ['Name'])

lol_2_top_score.head(10)
```

Out[32]:

	Name	Class	Role	Tier	Score	Trend	Win %	Role %	Pick %	Ban %	KDA
95	Lulu	Controller	SUPPORT	S+	92.89	-0.68	0.5003	96.96%	0.1281	0.2269	3.04
68	Jhin	Marksman	ADC	S+	92.76	-1.47	0.5135	98.76%	0.2286	0.0569	3.02
151	Sett	Fighter	TOP	S+	92.52	2.29	0.5055	84.73%	0.0794	0.0695	1.79
88	Lee Sin	Fighter	JUNGLE	S+	91.81	-0.08	0.4825	95.08%	0.1518	0.1482	2.79
29	Diana	Fighter	JUNGLE	S+	91.29	8.33	0.5125	86.44%	0.1302	0.1918	2.46
216	Yasuo	Fighter	MID	S+	91.15	4.99	0.5051	72.52%	0.1165	0.2400	1.78
62	Janna	Controller	SUPPORT	S+	90.63	38.71	0.5321	95.09%	0.1280	0.0693	3.24
201	Viego	Assassin	JUNGLE	S+	87.83	5.35	0.5032	95.78%	0.1360	0.1418	2.51
222	Yuumi	Controller	SUPPORT	S+	87.74	8.01	0.4807	98.86%	0.1085	0.2762	4.10
2	Akali	Assassin	TOP	S+	87.73	29.87	0.4970	44.38%	0.0619	0.2171	2.13

In [33]:

```
sorted_lol_3_score = lol_3.sort_values('Score', ascending = False)
#sorted_lol_3_score.head(10)

lol_3_top_score = sorted_lol_3_score[sorted_lol_3_score['Score'] >= 85]
lol_3_top_score = lol_3_top_score.dropna()
lol_3_top_score = lol_3_top_score.drop_duplicates(subset = ['Name'])

lol_3_top_score.head(10)
```

Out[33]:

	Name	Class	Role	Tier	Score	Trend	Win %	Role %	Pick %	Ban %	KDA
1	Ahri	Mage	MID	S+	95.22	39.37	0.5340	94.04%	0.1529	0.0893	2.59
227	Yuumi	Controller	SUPPORT	S+	95.16	7.42	0.4926	98.43%	0.1197	0.2678	4.14
231	Zeri	Marksman	ADC	S+	93.51	7.40	0.5232	81.37%	0.1821	0.5098	2.45
99	Lulu	Controller	SUPPORT	S+	93.35	0.46	0.5133	95.63%	0.1259	0.2053	3.08
92	Lee Sin	Fighter	JUNGLE	S+	89.35	-2.46	0.4759	93.27%	0.1562	0.1411	2.67
61	Irelia	Fighter	TOP	S+	89.17	13.34	0.4970	59.51%	0.0629	0.2067	1.60
156	Sett	Fighter	TOP	S+	88.44	-4.09	0.4898	80.25%	0.0737	0.0696	1.69
30	Darius	Fighter	TOP	S+	88.09	4.92	0.5010	94.03%	0.0639	0.1475	1.83
191	Tryndamere	Fighter	TOP	S+	87.69	4.11	0.5077	82.17%	0.0593	0.1808	1.84
41	Fiora	Fighter	TOP	S+	87.66	9.35	0.4982	97.43%	0.0670	0.1189	1.71

In [34]:

```
sorted_lol_4_score = lol_4.sort_values('Score', ascending = False)
#sorted_lol_4_score.head(10)

lol_4_top_score = sorted_lol_4_score[sorted_lol_4_score['Score'] >= 75]
lol_4_top_score = lol_4_top_score.dropna()
lol_4_top_score = lol_4_top_score.drop_duplicates(subset = ['Name'])

lol_4_top_score.head(10)
```

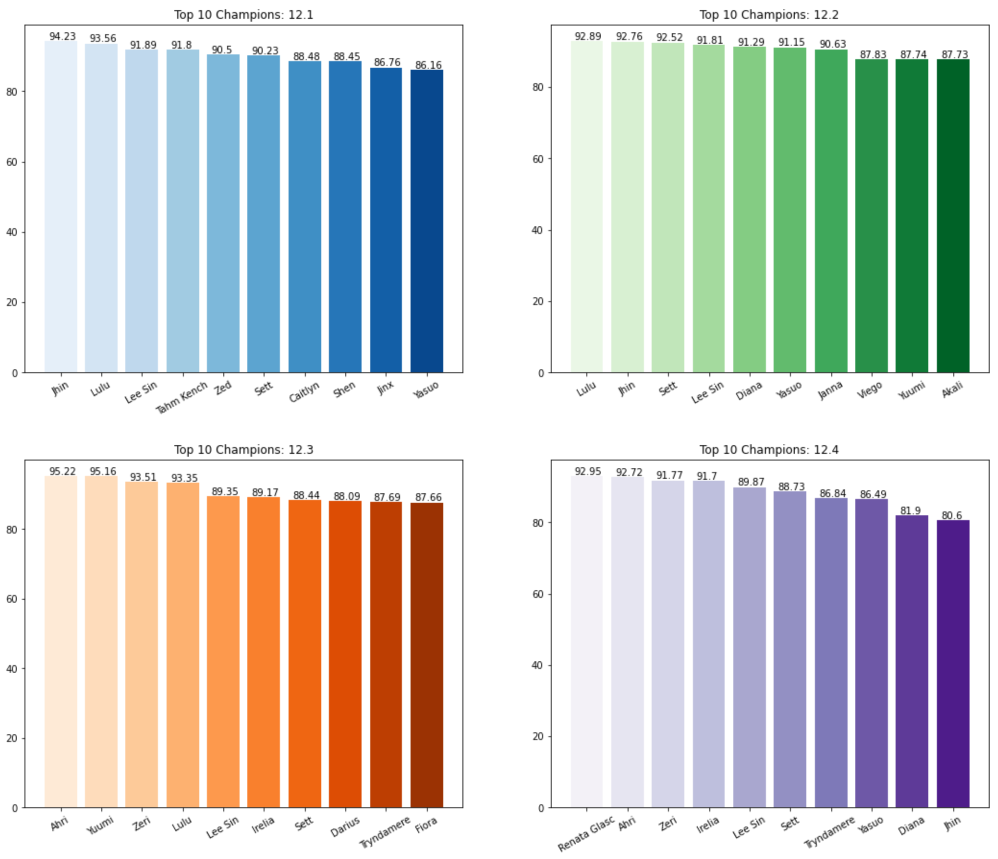
Out[34]:

	Name	Class	Role	Tier	Score	Trend	Win %	Role %	Pick %	Ban %	KDA
130	Renata Glasc	Mage	SUPPORT	S+	92.95	0.00	0.5086	93.36%	0.2342	0.2983	2.58
1	Ahri	Mage	MID	S+	92.72	-2.50	0.5162	95.11%	0.1398	0.1261	2.54
217	Zeri	Marksman	ADC	S+	91.77	-1.73	0.5030	87.15%	0.1600	0.4816	2.33
56	Irelia	Fighter	TOP	S+	91.70	2.52	0.5020	72.18%	0.0787	0.2023	1.64
85	Lee Sin	Fighter	JUNGLE	S+	89.87	0.53	0.4730	94.29%	0.1548	0.1322	2.64
147	Sett	Fighter	TOP	S+	88.73	0.30	0.5089	84.87%	0.0832	0.0723	1.76
179	Tryndamere	Fighter	TOP	S+	86.84	-0.86	0.5156	87.82%	0.0667	0.2060	1.82
207	Yasuo	Fighter	MID	S+	86.49	6.14	0.4861	77.68%	0.1309	0.2343	1.71
29	Diana	Fighter	JUNGLE	S+	81.90	-3.00	0.5178	86.03%	0.1088	0.1545	2.48
65	Jhin	Marksman	ADC	S+	80.60	6.19	0.5125	98.78%	0.2190	0.0563	2.94

In [35]:

```
lol_1_top_score_legend = lol_1_top_score['Name'].iloc[0:10]
lol_1_top_score_y = lol_1_top_score['Score'].iloc[0:10]
#print(lol_1_top_score_legend)
#print(lol_1_top_score_y)

lol_2_top_score_legend = lol_2_top_score['Name'].iloc[0:10]
lol_2_top_score_y = lol_2_top_score['Score'].iloc[0:10]
#print(lol_2_top_score_legend)
#print(lol_2_top_score_y)

lol_3_top_score_legend = lol_3_top_score['Name'].iloc[0:10]
lol_3_top_score_y = lol_3_top_score['Score'].iloc[0:10]
#print(lol_3_top_score_legend)
#print(lol_3_top_score_y)

lol_4_top_score_legend = lol_4_top_score['Name'].iloc[0:10]
lol_4_top_score_y = lol_4_top_score['Score'].iloc[0:10]
#print(lol_4_top_score_legend)
#print(lol_4_top_score_y)


plt.figure(figsize = (18, 15))
pal1 = sns.color_palette("Blues", 10)
sns.set_palette(pal1)
ax1 = plt.subplot(2, 2, 1)
i = 0
for y in lol_1_top_score_y:
    plt.bar(i, y)
    i += 1
plt.title("Top 10 Champions: 12.1")
```

```
ax1.set_xticks(range(10))
ax1.set_xticklabels([label for label in lol_1_top_score_legend], rotation = 30)

for i, v in enumerate(lol_1_top_score_y):
    ax1.text(i - 0.3, v + 0.4, str(v))


pal2 = sns.color_palette("Greens", 10)
sns.set_palette(pal2)
ax2 = plt.subplot(2, 2, 2)
i = 0
for y in lol_2_top_score_y:
    plt.bar(i, y)
    i += 1
plt.title("Top 10 Champions: 12.2")
ax2.set_xticks(range(10))
ax2.set_xticklabels([label for label in lol_2_top_score_legend], rotation = 30)

for i, v in enumerate(lol_2_top_score_y):
    ax2.text(i - 0.3, v + 0.4, str(v))


pal3 = sns.color_palette("Oranges", 10)
sns.set_palette(pal3)
ax3 = plt.subplot(2, 2, 3)
i = 0
for y in lol_3_top_score_y:
    plt.bar(i, y)
    i += 1
plt.title("Top 10 Champions: 12.3")
ax3.set_xticks(range(10))
ax3.set_xticklabels([label for label in lol_3_top_score_legend], rotation = 30)

for i, v in enumerate(lol_3_top_score_y):
    ax3.text(i - 0.3, v + 0.4, str(v))


pal3 = sns.color_palette("Purples", 10)
sns.set_palette(pal3)
ax4 = plt.subplot(2, 2, 4)
i = 0
for y in lol_4_top_score_y:
    plt.bar(i, y)
    i += 1
plt.title("Top 10 Champions: 12.4")
ax4.set_xticks(range(10))
ax4.set_xticklabels([label for label in lol_4_top_score_legend], rotation = 30)

for i, v in enumerate(lol_4_top_score_y):
    ax4.text(i - 0.3, v + 0.4, str(v))


plt.subplots_adjust(hspace = 0.25)

plt.savefig("top_10_champions_separate_patches.png")
plt.show()
```



These are the top 10 champions for each patch based on their scores. Scores are determined by champion's Win %, KDA, Ban %, etc. and put into a specific algorithm done through MetaSrc.

In [36]:

```
lol_1_top_score_name = lol_1_top_score_legend
#print(lol_1_top_score_name)

lol_2_top_score_name = lol_2_top_score_legend
#print(lol_2_top_score_name)

lol_3_top_score_name = lol_3_top_score_legend
#print(lol_3_top_score_name)

lol_4_top_score_name = lol_4_top_score_legend
#print(lol_4_top_score_name)


lol_top_score_name_old = []
```

```python
lol_top_score_name_old.append(lol_1_top_score_name)
lol_top_score_name_old.append(lol_2_top_score_name)
lol_top_score_name_old.append(lol_3_top_score_name)
lol_top_score_name_old.append(lol_4_top_score_name)

lol_top_score_name = []
for name in lol_top_score_name_old:
    for champion in name:
        if champion not in lol_top_score_name:
            lol_top_score_name.append(champion)
#print(lol_top_score_name)
#print(len(lol_top_score_name))

lol_top_score_score = []
lol_top_score_trend = []


for name in lol_top_score_name:
    #print(name)

    lol_champion_score = []
    lol_champion_trend = []
    champion_name_1 = lol_1[lol_1['Name'] == name]
    #print(champion_name_1)
    champion_score_1 = champion_name_1['Score'].mean()
    #print(champion_score_1)
    champion_trend_1 = champion_name_1['Trend'].mean()
    #print(champion_trend_1)
    lol_champion_score.append(round(champion_score_1, 2))
    lol_champion_trend.append(round(champion_trend_1, 2))

    champion_name_2 = lol_2[lol_2['Name'] == name]
    #print(champion_name_2)
    champion_score_2 = champion_name_2['Score'].mean()
    #print(champion_score_2)
    champion_trend_2 = champion_name_2['Trend'].mean()
    #print(champion_trend_2)
    lol_champion_score.append(round(champion_score_2, 2))
    lol_champion_trend.append(round(champion_trend_2, 2))

    champion_name_3 = lol_3[lol_3['Name'] == name]
    #print(champion_name_3)
    champion_score_3 = champion_name_3['Score'].mean()
    #print(champion_score_3)
    champion_trend_3 = champion_name_3['Trend'].mean()
    #print(champion_trend_3)
    lol_champion_score.append(round(champion_score_3, 2))
    lol_champion_trend.append(round(champion_trend_3, 2))

    champion_name_4 = lol_4[lol_4['Name'] == name]
    #print(champion_name_4)
    champion_score_4 = champion_name_4['Score'].mean()
    #print(champion_score_4)
    champion_trend_4 = champion_name_4['Trend'].mean()
    #print(champion_trend_4)
    lol_champion_score.append(round(champion_score_4, 2))
    lol_champion_trend.append(round(champion_trend_4, 2))

    lol_top_score_score.append(lol_champion_score)
    lol_top_score_trend.append(lol_champion_trend)

#print(len(lol_top_score_name))
#print(len(lol_top_score_score))
#print(len(lol_top_score_trend))





fig, axs = plt.subplots(nrows = 8, ncols = 3, figsize = (15, 45))
plt.subplots_adjust(hspace = 0.5, wspace = 0.5)
fig.suptitle("Score & Trend Analysis Over 4 Patches", y = 0.9)

num = 0
x = range(4)
colors = ['indianred', 'navy']
for score, trend, ax in zip(lol_top_score_score, lol_top_score_trend, axs.ravel()):
    ax.set_title(lol_top_score_name[num])
    ax.set_xlabel("Patches")
    ax.set_ylabel("Score", color = colors[0])
    ax.bar(x, score, color = colors[0])
    ax.tick_params(axis = 'y', colors = colors[0])
    for i, v in enumerate(score):
        ax.text(i - 0.2, v + 0.4, str(v))

    ax2 = ax.twinx() #shares the x-axis but creates a new y-axis
    ax2.set_ylabel("Trend", color = colors[1])
    ax2.plot(x, trend, color = colors[1])
    ax2.tick_params(axis = 'y', colors = colors[1])

    ax.set_xticks(x)
    ax.set_xticklabels(['12.1', '12.2', '12.3', '12.4'])
    num += 1

plt.savefig("trends_scores_for_top_10_champions.png")
plt.show()
```

```
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```
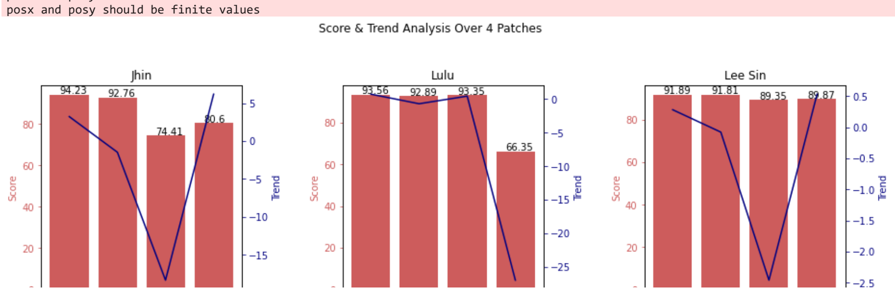
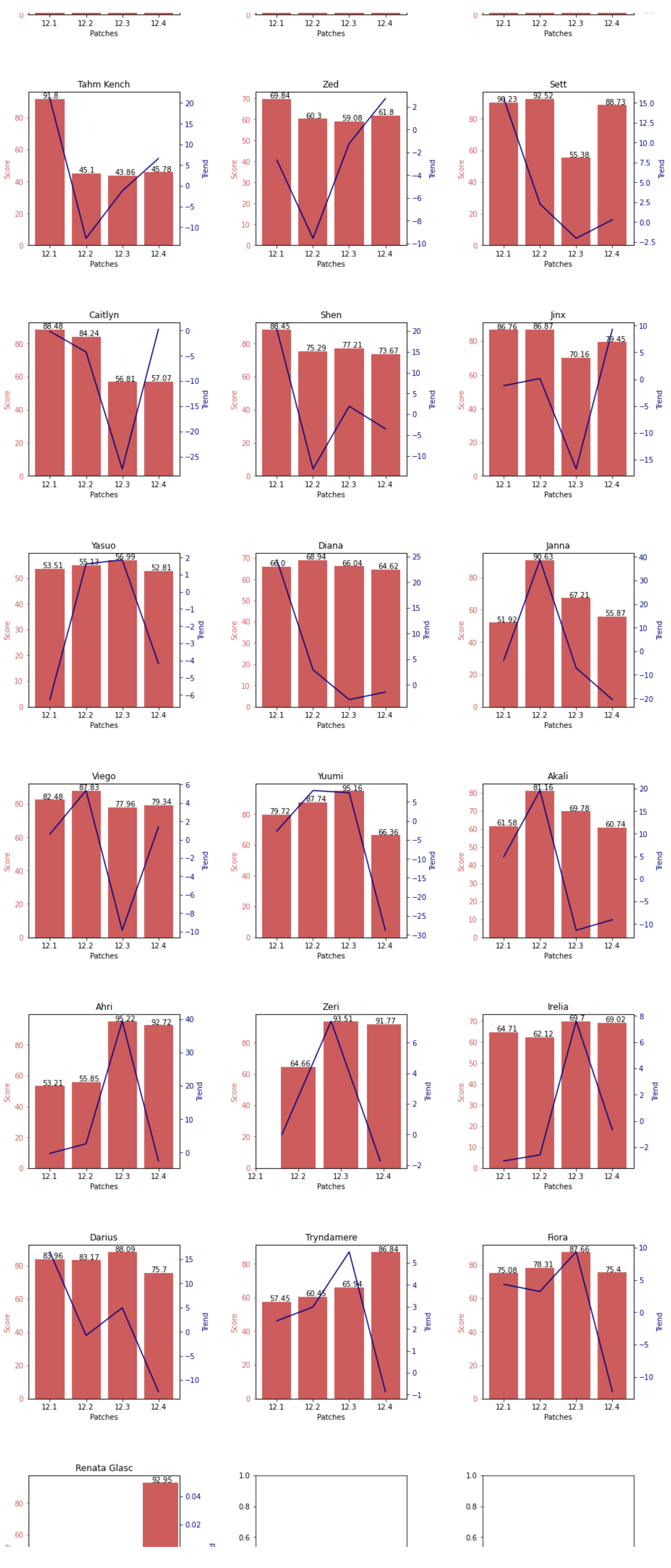
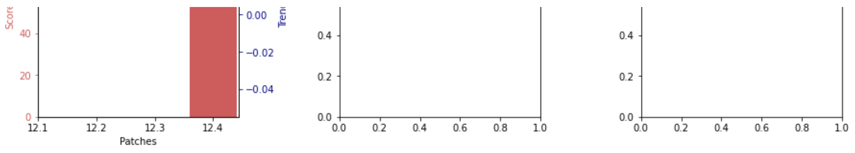




Patches
Tahm Kench
91.8
45.1
43.86
45.78
Zed
69.84
60.3
59.08
61.8
Sett
90.23
92.52
55.38
88.73
Caitlyn
88.48
84.24
56.81
57.07
Shen
88.45
75.29
77.21
73.67
Jinx
86.76
86.87
70.16
79.45
Yasuo
53.51
55.13
56.99
52.81
Diana
66.0
68.94
66.04
64.62
Janna
51.92
90.63
67.21
55.87
Viego
82.48
87.83
77.96
79.34
Yuumi
79.72
87.74
95.16
66.36
Akali
61.58
81.16
69.78
60.74
Ahri
53.21
55.85
95.22
92.72
Zeri
64.66
93.51
91.77
Irelia
64.71
62.12
69.7
69.02
Darius
83.96
83.17
88.09
75.7
Tryndamere
57.45
60.45
65.94
86.84
Fiora
75.08
78.31
87.66
75.4
Renata Glasc
92.95
Score
Trend
12.1
12.2
12.3
12.4



As there is a lot of data presented here, we are looking at the top 10 champions through all four patches, and what their scores and trends were through all the patches.

The trends you see on the graphs indicate (and predict) the overall direction of the champion's score. As you can see, a majority of the trends are pretty accurate through all the patches. We can predict that whatever trends have a downward trend for patch 12.4, they will most likely go up; while the upward trends will most likely go down as the champions (especially strong ones) are worked on and tweaked every patch.

Return to Tasks

1.5 Top 10 Champions Based on Score, What is Win % and Ban %?

In [65]:

```python
lol_1['Win %'] = lol_1['Win %'].str.rstrip('%').astype('float') / 100
lol_2['Win %'] = lol_2['Win %'].str.rstrip('%').astype('float') / 100
lol_3['Win %'] = lol_3['Win %'].str.rstrip('%').astype('float') / 100
lol_4['Win %'] = lol_4['Win %'].str.rstrip('%').astype('float') / 100

lol_1['Ban %'] = lol_1['Ban %'].str.rstrip('%').astype('float') / 100
lol_2['Ban %'] = lol_2['Ban %'].str.rstrip('%').astype('float') / 100
lol_3['Ban %'] = lol_3['Ban %'].str.rstrip('%').astype('float') / 100
lol_4['Ban %'] = lol_4['Ban %'].str.rstrip('%').astype('float') / 100
```

In [66]:

```python
lol_top_score_win = []
lol_top_score_ban = []


for name in lol_top_score_name:
    #print(name)

    lol_champion_win = []
    lol_champion_ban = []
    champion_name_1 = lol_1[lol_1['Name'] == name]
    #print(champion_name_1)
    champion_win_1 = champion_name_1['Win %'].mean()
    #print(champion_win_1)
    champion_ban_1 = champion_name_1['Ban %'].mean()
    #print(champion_ban_1)
    lol_champion_win.append(round(champion_win_1, 3))
    lol_champion_ban.append(round(champion_ban_1, 3))

    champion_name_2 = lol_2[lol_2['Name'] == name]
    #print(champion_name_2)
    champion_win_2 = champion_name_2['Win %'].mean()
    #print(champion_win_2)
    champion_ban_2 = champion_name_2['Ban %'].mean()
    #print(champion_ban_2)
    lol_champion_win.append(round(champion_win_2, 3))
    lol_champion_ban.append(round(champion_ban_2, 3))

    champion_name_3 = lol_3[lol_3['Name'] == name]
    #print(champion_name_3)
    champion_win_3 = champion_name_3['Win %'].mean()
    #print(champion_win_3)
    champion_ban_3 = champion_name_3['Ban %'].mean()
    #print(champion_ban_3)
    lol_champion_win.append(round(champion_win_3, 3))
    lol_champion_ban.append(round(champion_ban_3, 3))

    champion_name_4 = lol_4[lol_4['Name'] == name]
    #print(champion_name_4)
    champion_win_4 = champion_name_4['Win %'].mean()
    #print(champion_win_3)
    champion_ban_4 = champion_name_4['Ban %'].mean()
    #print(champion_ban_3)
    lol_champion_win.append(round(champion_win_4, 3))
    lol_champion_ban.append(round(champion_ban_4, 3))

    lol_top_score_win.append(lol_champion_win)
    lol_top_score_ban.append(lol_champion_ban)

#print(lol_top_score_name)
#print(lol_top_score_win)
#print(lol_top_score_ban)

#print(len(lol_top_score_name))
#print(len(lol_top_score_win))
#print(len(lol_top_score_ban))



fig, axs = plt.subplots(nrows = 8, ncols = 3, figsize = (15, 45))
plt.subplots_adjust(hspace = 0.25, wspace = 0.25)
fig.suptitle("Win % to Ban % Rate Analysis Over 4 Patches", y = 0.9)


#bar 1
n = 1
t = 2
d = 4
w = 0.8
x_values1 = [t * element + w * n for element in range(d)]

#bar 2
n = 2
t = 2
d = 4
w = 0.8
x_values2 = [t * element + w * n for element in range(d)]


num = 0
colors = ['thistle', 'cadetblue']
for win, ban, ax in zip(lol_top_score_win, lol_top_score_ban, axs.ravel()):
    ax.set_title(lol_top_score_name[num])
    ax.set_xlabel("Patches")
    ax.set_ylabel("% in Proportion")
    ax.bar(x_values1, win, color = colors[0], label = 'Win %')
    ax.bar(x_values2, ban, color = colors[1], label = 'Ban %')
    for i, v in enumerate(win):
        ax.text(x_values1[i] - 0.5, v + 0.001, str(v))

    for i, v in enumerate(ban):
        ax.text(x_values2[i] - 0.4, v + 0.001, str(v))

    ax.set_xticks(x_values1)
    ax.set_xticklabels(['12.1', '12.2', '12.3', '12.4'])
    num += 1

fig.legend(['Win %', 'Ban %'], loc = 7)
plt.savefig("win_ban_rate_for_top_10_champions.png")
plt.show()
```

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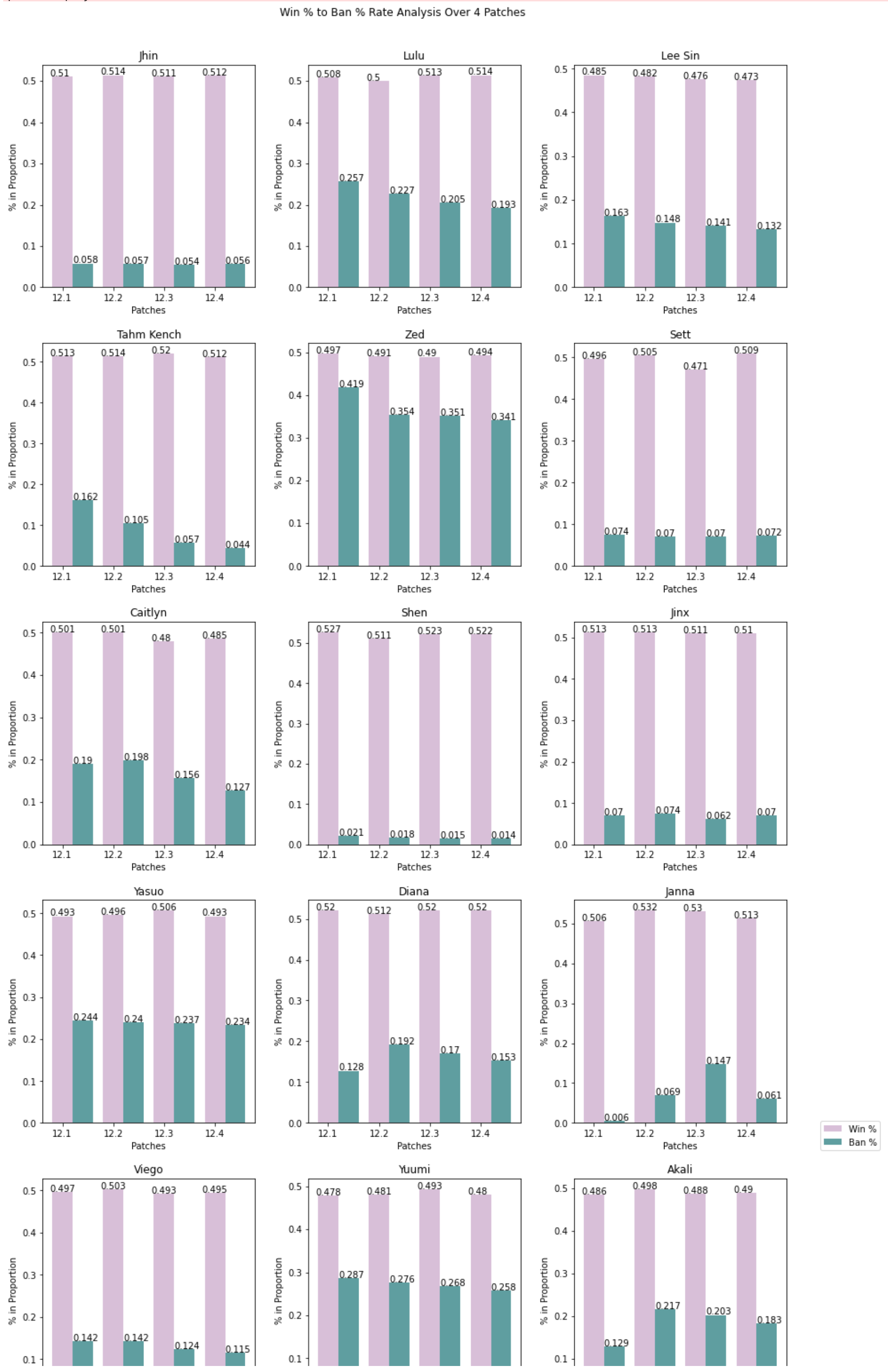
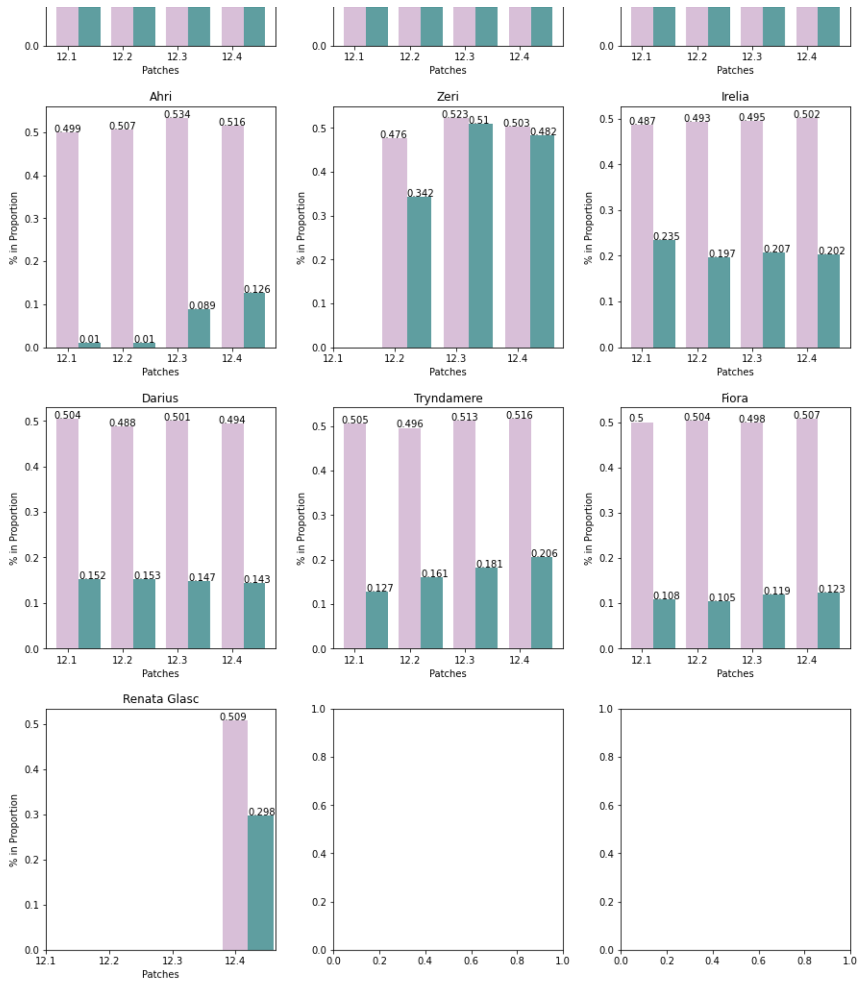




All these graphs that we are looking at have to do with the top 10 champions throughout all 4 patches as well. However, we are looking at the Win % to Ban % for each champion. Any champions that are missing a couple of patches mean they were added after patch 12.1.

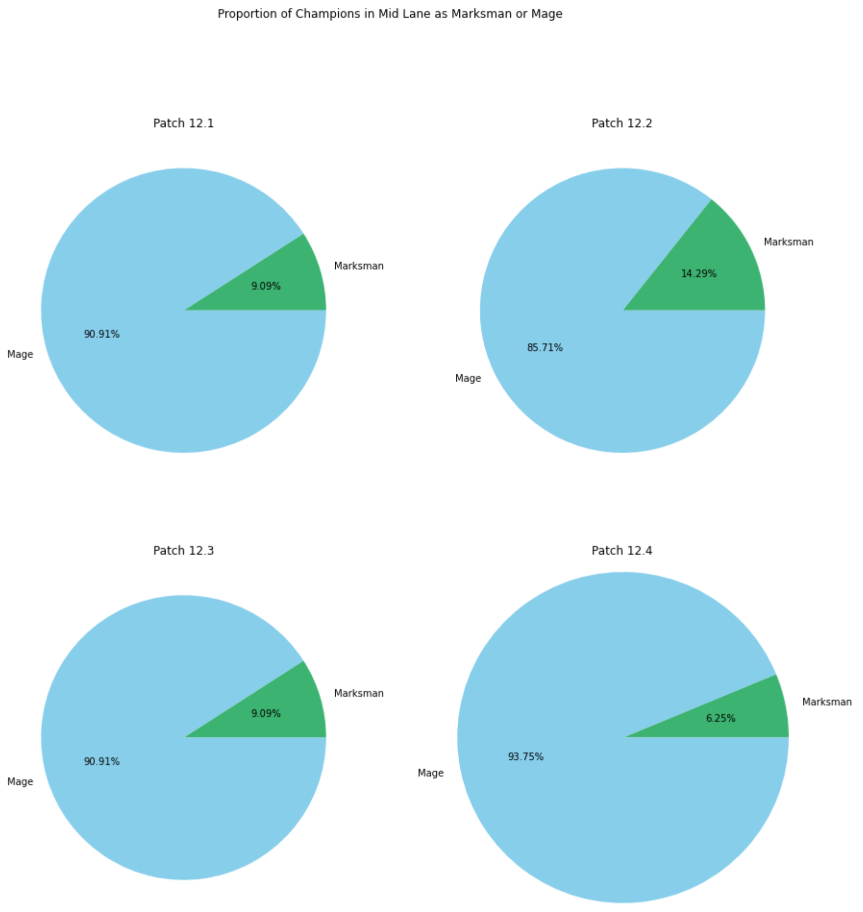
A high Win % and high Ban % would indicate that the champion is too strong, therefore the champion keeps getting banned such as Zeri, Zed, and even Renata Glasc, and Yuumi. A high Win % with a low Ban % would indicate that the champion is strong, but relies more on the player's skill and ability; Jhin, Sett, Shen, and Jinx are examples of these types of champions.

Return to Tasks

1.6 Proportion of Champions in Mid Lane as Marksman or Mage?

In [59]:

```python
lol_1_mid = lol_1[lol_1['Role'] == 'MID']
lol_1_mid_marksman = lol_1_mid['Class'][lol_1_mid['Class'] == 'Marksman']
lol_1_mid_mage = lol_1_mid['Class'][lol_1_mid['Class'] == 'Mage']
lol_1_mid_marksman = len(lol_1_mid_marksman)
lol_1_mid_mage = len(lol_1_mid_mage)
#print(lol_1_mid_marksman)
#print(lol_1_mid_mage)

lol_2_mid = lol_2[lol_2['Role'] == 'MID']
lol_2_mid_marksman = lol_2_mid['Class'][lol_2_mid['Class'] == 'Marksman']
lol_2_mid_mage = lol_2_mid['Class'][lol_2_mid['Class'] == 'Mage']
lol_2_mid_marksman = len(lol_2_mid_marksman)
lol_2_mid_mage = len(lol_2_mid_mage)
#print(lol_2_mid_marksman)
#print(lol_2_mid_mage)

lol_3_mid = lol_3[lol_3['Role'] == 'MID']
lol_3_mid_marksman = lol_3_mid['Class'][lol_3_mid['Class'] == 'Marksman']
lol_3_mid_mage = lol_3_mid['Class'][lol_3_mid['Class'] == 'Mage']
lol_3_mid_marksman = len(lol_3_mid_marksman)
lol_3_mid_mage = len(lol_3_mid_mage)
#print(lol_3_mid_marksman)
#print(lol_3_mid_mage)

lol_4_mid = lol_4[lol_4['Role'] == 'MID']
lol_4_mid_marksman = lol_4_mid['Class'][lol_4_mid['Class'] == 'Marksman']
lol_4_mid_mage = lol_4_mid['Class'][lol_4_mid['Class'] == 'Mage']
lol_4_mid_marksman = len(lol_4_mid_marksman)
lol_4_mid_mage = len(lol_4_mid_mage)
#print(lol_4_mid_marksman)
#print(lol_4_mid_mage)


lol_1_mid_marksman_mage = []
lol_1_mid_marksman_mage.append(lol_1_mid_marksman)
lol_1_mid_marksman_mage.append(lol_1_mid_mage)

lol_2_mid_marksman_mage = []
lol_2_mid_marksman_mage.append(lol_2_mid_marksman)
lol_2_mid_marksman_mage.append(lol_2_mid_mage)

lol_3_mid_marksman_mage = []
lol_3_mid_marksman_mage.append(lol_3_mid_marksman)
lol_3_mid_marksman_mage.append(lol_3_mid_mage)

lol_4_mid_marksman_mage = []
lol_4_mid_marksman_mage.append(lol_4_mid_marksman)
lol_4_mid_marksman_mage.append(lol_4_mid_mage)

lol_mid_marksman_mage = []
lol_mid_marksman_mage.append(lol_1_mid_marksman_mage)
lol_mid_marksman_mage.append(lol_2_mid_marksman_mage)
lol_mid_marksman_mage.append(lol_3_mid_marksman_mage)
lol_mid_marksman_mage.append(lol_4_mid_marksman_mage)

#print(lol_mid_marksman_mage)


fig, axs = plt.subplots(nrows = 2, ncols = 2, figsize = (15, 15))
plt.subplots_adjust(hspace = 0.2, wspace = 0.2)
fig.suptitle("Proportion of Champions in Mid Lane as Marksman or Mage", y = 1)

labels = ['Marksman', 'Mage']
num = 1
colors = ['mediumseagreen', 'skyblue']
for pie, ax in zip(lol_mid_marksman_mage, axs.ravel()):
    ax.set_title("Patch 12." + str(num))
    ax.pie(pie, labels = labels, colors = colors, autopct = '%0.2f%%')
    plt.axis('equal')

    num += 1

plt.savefig("mid_marksman_mage_percent.png")
plt.show()
```



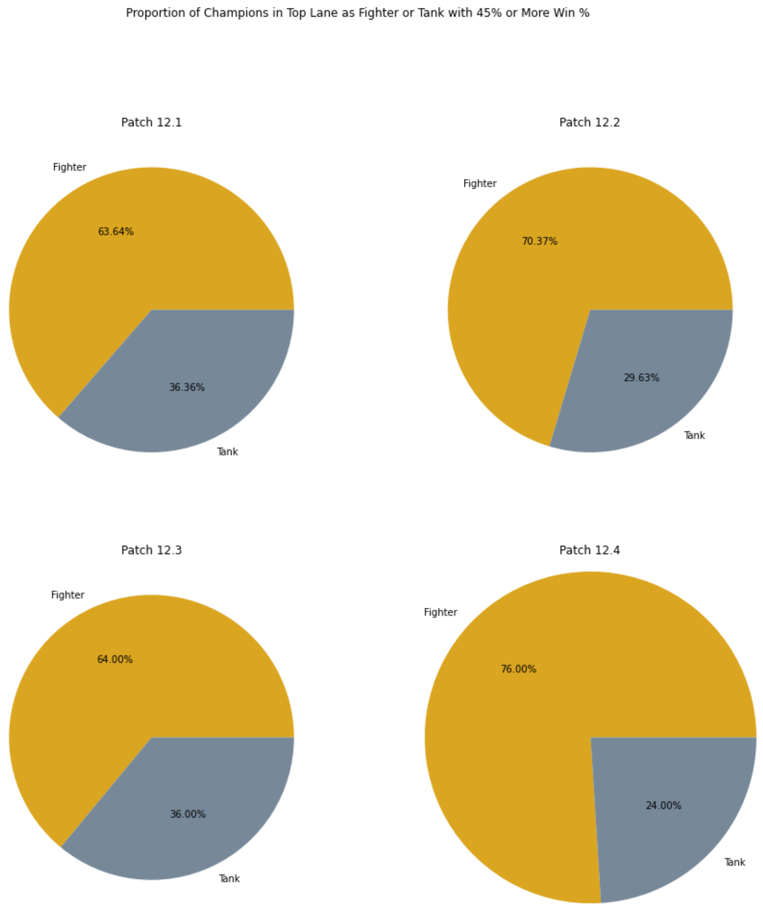
Based on all 4 patches, and the graphs based on those patches, it would show that there are many more Mages in the Mid lane, then there are Marksman.

Return to Tasks

1.7 Proportion of Champions in Top Lane as Fighter or Collector with 50% or More Win %?

In [58]:
```
lol_1_top = lol_1[lol_1['Role'] == 'TOP']
lol_1_top_fighter = lol_1_top[lol_1_top['Class'] == 'Fighter']
lol_1_top_fighter_45 = lol_1_top_fighter[lol_1_top_fighter['Win %'] >= 0.5]
lol_1_top_fighter_45 = len(lol_1_top_fighter_45)
lol_1_top_tank = lol_1_top[lol_1_top['Class'] == 'Tank']
lol_1_top_tank_45 = lol_1_top_tank[lol_1_top_tank['Win %'] >= 0.5]
lol_1_top_tank_45 = len(lol_1_top_tank_45)
#print(lol_1_top_fighter_45)
#print(lol_1_top_tank_45)

lol_2_top = lol_2[lol_2['Role'] == 'TOP']
lol_2_top_fighter = lol_2_top[lol_2_top['Class'] == 'Fighter']
lol_2_top_fighter_45 = lol_2_top_fighter[lol_2_top_fighter['Win %'] >= 0.5]
lol_2_top_fighter_45 = len(lol_2_top_fighter_45)
lol_2_top_tank = lol_2_top[lol_2_top['Class'] == 'Tank']
lol_2_top_tank_45 = lol_2_top_tank[lol_2_top_tank['Win %'] >= 0.5]
lol_2_top_tank_45 = len(lol_2_top_tank_45)
#print(lol_2_top_fighter_45)
#print(lol_2_top_tank_45)

lol_3_top = lol_3[lol_3['Role'] == 'TOP']
lol_3_top_fighter = lol_3_top[lol_3_top['Class'] == 'Fighter']
lol_3_top_fighter_45 = lol_3_top_fighter[lol_3_top_fighter['Win %'] >= 0.5]
lol_3_top_fighter_45 = len(lol_3_top_fighter_45)
lol_3_top_tank = lol_3_top[lol_3_top['Class'] == 'Tank']
lol_3_top_tank_45 = lol_3_top_tank[lol_3_top_tank['Win %'] >= 0.5]
lol_3_top_tank_45 = len(lol_3_top_tank_45)
#print(lol_3_top_fighter_45)
#print(lol_3_top_tank_45)

lol_4_top = lol_4[lol_4['Role'] == 'TOP']
lol_4_top_fighter = lol_4_top[lol_4_top['Class'] == 'Fighter']
lol_4_top_fighter_45 = lol_4_top_fighter[lol_4_top_fighter['Win %'] >= 0.5]
lol_4_top_fighter_45 = len(lol_4_top_fighter_45)
lol_4_top_tank = lol_4_top[lol_4_top['Class'] == 'Tank']
lol_4_top_tank_45 = lol_4_top_tank[lol_4_top_tank['Win %'] >= 0.5]
lol_4_top_tank_45 = len(lol_4_top_tank_45)
#print(lol_4_top_fighter_45)
#print(lol_4_top_tank_45)
```

```
lol_1_top_fighter_tank = []
lol_1_top_fighter_tank.append(lol_1_top_fighter_45)
lol_1_top_fighter_tank.append(lol_1_top_tank_45)

lol_2_top_fighter_tank = []
lol_2_top_fighter_tank.append(lol_2_top_fighter_45)
lol_2_top_fighter_tank.append(lol_2_top_tank_45)

lol_3_top_fighter_tank = []
lol_3_top_fighter_tank.append(lol_3_top_fighter_45)
lol_3_top_fighter_tank.append(lol_3_top_tank_45)

lol_4_top_fighter_tank = []
lol_4_top_fighter_tank.append(lol_4_top_fighter_45)
lol_4_top_fighter_tank.append(lol_4_top_tank_45)

lol_top_fighter_tank = []
lol_top_fighter_tank.append(lol_1_top_fighter_tank)
lol_top_fighter_tank.append(lol_2_top_fighter_tank)
lol_top_fighter_tank.append(lol_3_top_fighter_tank)
lol_top_fighter_tank.append(lol_4_top_fighter_tank)
#print(lol_top_fighter_tank)


fig, axs = plt.subplots(nrows = 2, ncols = 2, figsize = (15, 15))
plt.subplots_adjust(hspace = 0.2, wspace = 0.2)
fig.suptitle("Proportion of Champions in Top Lane as Fighter or Tank with 45% or More Win %", y = 1)

labels = ['Fighter', 'Tank']
num = 1
colors = ['goldenrod', 'lightslategray']
for pie, ax in zip(lol_top_fighter_tank, axs.ravel()):
    ax.set_title("Patch 12." + str(num))
    ax.pie(pie, labels = labels, colors = colors, autopct = '%0.2f%%')
    plt.axis('equal')

    num += 1

plt.savefig("top_fighter_tank_45_win_percent.png")
plt.show()
```



Looking at all 4 graphs throughout the different patches shows that being a Fighter in the Top lane has a higher Win % than a Tank would. This would suggest that a player would be better off picking a Fighter as a Top laner to try to have a higher advantage at winning the game.

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2. Champions in Most Recent Patch (12.4):

2.1 Higher Win % in Mid or Support Lane for Lux?

In [41]:
```
lol_4['Win %'] = lol_4['Win %'].str.rstrip('%').astype('float') / 100
```

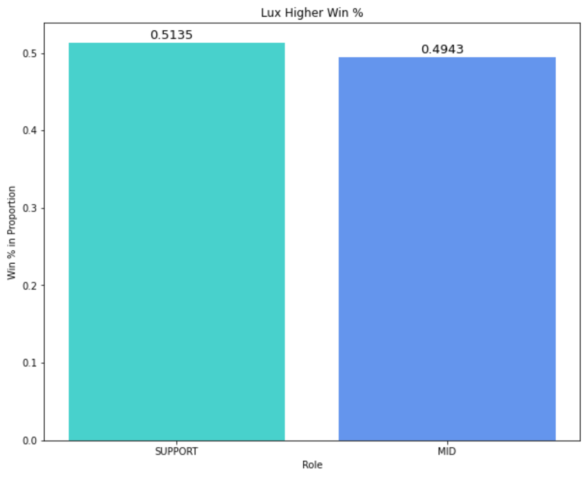
In [42]:
```
lol_4_lux = lol_4[lol_4['Name'] == 'Lux']
lol_4_lux.head()
```

Out[42]:

	Name	Class	Role	Tier	Score	Trend	Win %	Role %	Pick %	Ban %	KDA
92	Lux	Mage	SUPPORT	S	66.35	-27.0	0.5135	94.83%	10.76%	19.33%	3.05
93	Lux	Mage	MID	S	63.43	-2.2	0.4943	34.37%	6.63%	12.88%	2.78

In [43]:

```
lol_4_lux_win = lol_4_lux['Win %'].values
lol_4_lux_win = [ round(x, 4) for x in lol_4_lux_win ]
#print(lol_4_lux_win)


colors = ['mediumturquoise', 'cornflowerblue']
plt.figure(figsize = (10, 8))
ax = plt.subplot()

plt.bar(range(2), lol_4_lux_win, color = colors)

plt.title("Lux Higher Win %")
plt.ylabel("Win % in Proportion")
plt.xlabel("Role")

ax.set_xticks(range(2))
ax.set_xticklabels(['SUPPORT', 'MID'])
for i, v in enumerate(lol_4_lux_win):
    ax.text(i - 0.1, v + 0.005, str(v), size = 13)

plt.savefig("lux_higher_win_percent.png")
plt.show()
```



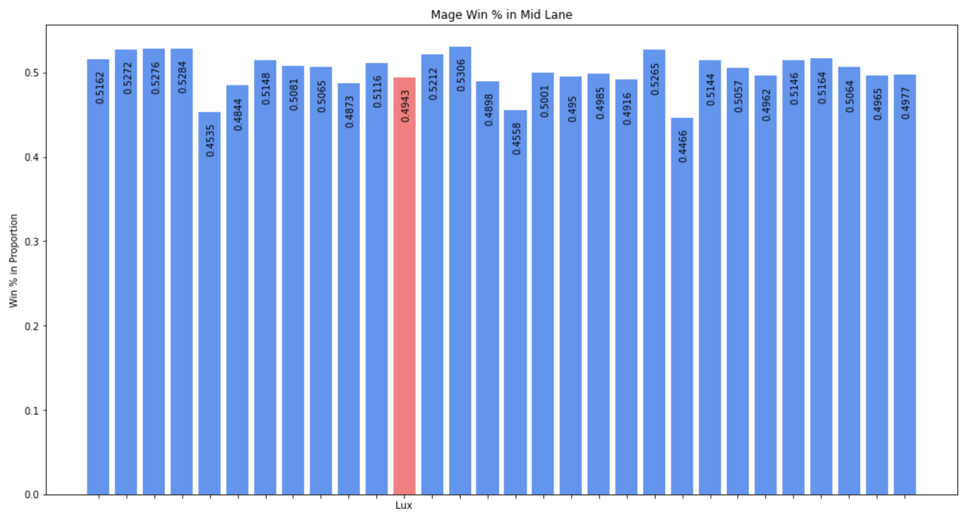
Based on Lux's Win %, a player would be better off picking Lux as a Mage in the Support lane in the 12.4 patch as Lux has a 51.35% chance of winning, while the Lux in the Mid lane only has 49.43%.

In [44]:
```
lol_4_mage = lol_4[lol_4['Class'] == 'Mage']
lol_4_mage.head()
```

Out[44]:

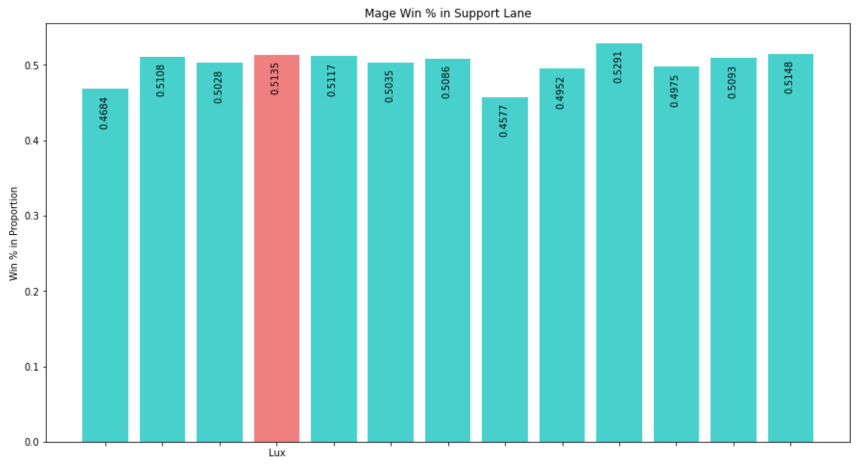
	Name	Class	Role	Tier	Score	Trend	Win %	Role %	Pick %	Ban %	KDA
1	Ahri	Mage	MID	S+	92.72	-2.50	0.5162	95.11%	13.98%	12.61%	2.54
9	Anivia	Mage	MID	A	53.94	1.19	0.5272	82.86%	3.00%	2.97%	2.57
10	Anivia	Mage	SUPPORT	C	35.06	3.87	0.4684	12.50%	0.42%	2.98%	2.12
11	Annie	Mage	MID	A	48.76	1.37	0.5276	86.54%	1.89%	0.79%	2.31
14	Aurelion Sol	Mage	MID	A	47.96	2.81	0.5284	90.56%	1.05%	0.35%	2.62

In [56]:
```
lol_4_mage = lol_4[lol_4['Class'] == 'Mage']
lol_4_mage_mid = lol_4_mage[lol_4_mage['Role'] == 'MID']
lol_4_mage_mid_win = lol_4_mage_mid['Win %'].values
lol_4_mage_mid_win = [ round(x, 4) for x in lol_4_mage_mid_win ]
#print(lol_4_mage_mid_win)
#print(len(lol_4_mage_mid_win))



colors = ['lightcoral' if (y == 0.4943) else 'cornflowerblue' for y in lol_4_mage_mid_win]
plt.figure(figsize = (17, 9))
ax = plt.subplot()

plt.bar(range(len(lol_4_mage_mid_win)), lol_4_mage_mid_win, color = colors)
for i, v in enumerate(lol_4_mage_mid_win):
    ax.text(i - 0.1, v - 0.05, str(v), size = 10, rotation = 90)

plt.title("Mage Win % in Mid Lane")
plt.ylabel("Win % in Proportion")

ax.set_xticks(range(len(lol_4_mage_mid_win)))
ax.set_xticklabels(['Lux' if (y == 0.4943) else '' for y in lol_4_mage_mid_win])

plt.savefig("mage_win_percent_mid_lane.png")
plt.show()
```



As the graph shows, there are many Mages in the Mid lane; about half of the champions have about 51 - 52% win rate, while the other half have about 48 - 49%. As you can see, in this patch (12.4) Lux has a lower Win % when in the Mid lane.

In [57]:
```python
lol_4_mage_support = lol_4_mage[lol_4_mage['Role'] == 'SUPPORT']
lol_4_mage_support_win = lol_4_mage_support['Win %'].values
lol_4_mage_support_win = [ round(x, 4) for x in lol_4_mage_support_win ]
#print(lol_4_mage_support_win)
#print(len(lol_4_mage_support_win))


colors = ['lightcoral' if (y == 0.5135) else 'mediumturquoise' for y in lol_4_mage_support_win]
plt.figure(figsize = (15, 8))
ax = plt.subplot()

plt.bar(range(len(lol_4_mage_support_win)), lol_4_mage_support_win, color = colors)
for i, v in enumerate(lol_4_mage_support_win):
    ax.text(i - 0.1, v - 0.05, str(v), size = 10, rotation = 90)

plt.title("Mage Win % in Support Lane")
plt.ylabel("Win % in Proportion")

ax.set_xticks(range(len(lol_4_mage_support_win)))
ax.set_xticklabels(['Lux' if (y == 0.5135) else '' for y in lol_4_mage_support_win])

plt.savefig("mage_win_percent_support_lane.png")
plt.show()
```



The Win % for Lux in the Support lane is pretty well as it is the top 3 of all Mages in the Support lane; this would suggest that Lux would be a relatively good champion to be chosen for the Support lane.

Due to the developers creating the game this way, all champions will have a Win % relatively close to 50% to allow a 50% chance to win or to lose.

Return to Tasks

2.2 In Akali's Pick %, Which in Top Lane, and Which in Mid Lane?

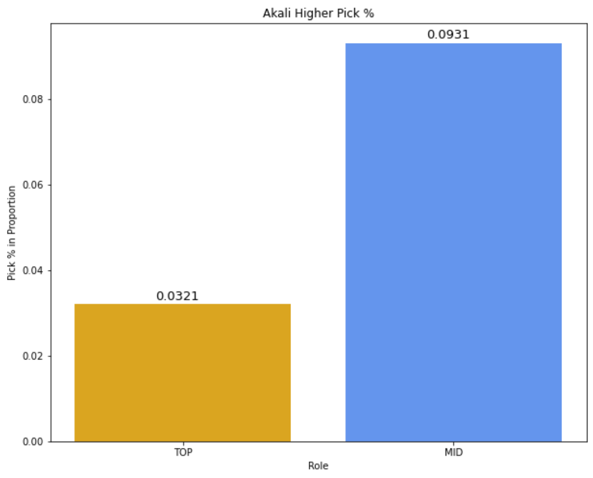
In [47]:
```python
lol_4['Pick %'] = lol_4['Pick %'].str.rstrip('%').astype('float') / 100
```

In [48]:
```python
lol_4_akali = lol_4[lol_4['Name'] == 'Akali']
lol_4_akali.head()
```

Out[48]:

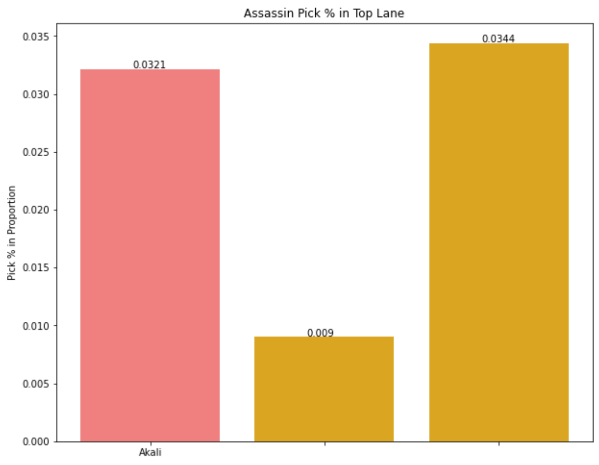
	Name	Class	Role	Tier	Score	Trend	Win %	Role %	Pick %	Ban %	KDA
2	Akali	Assassin	TOP	A	48.25	-26.55	0.4807	27.03%	0.0321	18.30%	2.03
3	Akali	Assassin	MID	S	73.23	8.46	0.4998	72.36%	0.0931	18.30%	2.32

In [49]:
```python
lol_4_akali_pick = lol_4_akali['Pick %'].values
lol_4_akali_pick = [ round(x, 4) for x in lol_4_akali_pick ]
#print(lol_4_akali_pick)



colors = ['goldenrod', 'cornflowerblue']
plt.figure(figsize = (10, 8))
ax = plt.subplot()

plt.bar(range(2), lol_4_akali_pick, color = colors)
plt.title("Akali Higher Pick %")
plt.ylabel("Pick % in Proportion")
plt.xlabel("Role")

ax.set_xticks(range(2))
ax.set_xticklabels(['TOP', 'MID'])
for i, v in enumerate(lol_4_akali_pick):
    ax.text(i - 0.1, v + 0.001, str(v), size = 13)

plt.savefig("akali_pick_percent.png")
plt.show()
```



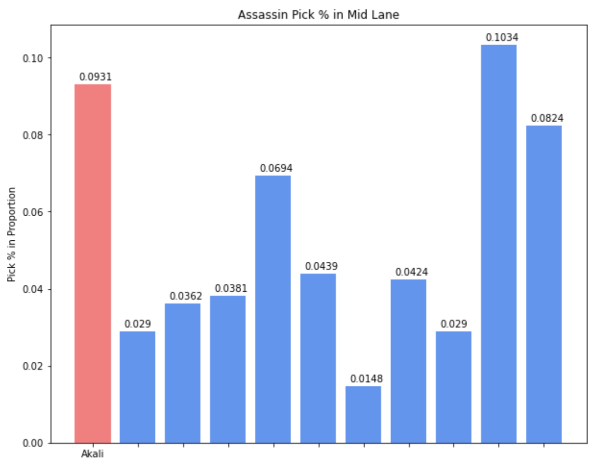
Looking at Akali's Pick % by Role, Akali is chosen a lot more as a Mid laner at 9.3%, than a Top laner at 3.2%; however, it is important to remember that the numbers on this graph is actually a pretty low Pick % compared to other champions in other classes and roles.

In [50]:
```
lol_4_assassin = lol_4[lol_4['Class'] == 'Assassin']
lol_4_assassin_top = lol_4_assassin[lol_4_assassin['Role'] == 'TOP']
lol_4_assassin_top_pick = lol_4_assassin_top['Pick %'].values
lol_4_assassin_top_pick = [ round(x, 4) for x in lol_4_assassin_top_pick ]
#print(lol_4_assassin_top_pick)
#print(len(lol_4_assassin_top_pick))


colors = ['lightcoral' if (y == 0.0321) else 'goldenrod' for y in lol_4_assassin_top_pick]
plt.figure(figsize = (10, 8))
ax = plt.subplot()

plt.bar(range(3), lol_4_assassin_top_pick, color = colors)
for i, v in enumerate(lol_4_assassin_top_pick):
    ax.text(i - 0.1, v + 0.0001, str(v), size = 10)

plt.title("Assassin Pick % in Top Lane")
plt.ylabel("Pick % in Proportion")

ax.set_xticks(range(3))
ax.set_xticklabels(['Akali' if (y == 0.0321) else '' for y in lol_4_assassin_top_pick])

plt.savefig("assassin_pick_percent_top_lane.png")
plt.show()
```



In the Top lane, Akali's (light red) Pick % is in the top 2, however the numbers are still relatively low as Akali's Pick % is only 3.2% in the Top lane. This would indicate that most players would not pick Akali or the other Assassins to be a Top laner.

In [51]:
```
lol_4_assassin_mid = lol_4_assassin[lol_4_assassin['Role'] == 'MID']
lol_4_assassin_mid_pick = lol_4_assassin_mid['Pick %'].values
lol_4_assassin_mid_pick = [ round(x, 4) for x in lol_4_assassin_mid_pick ]
#print(lol_4_assassin_mid_pick)
#print(len(lol_4_assassin_mid_pick))


colors = ['lightcoral' if (y == 0.0931) else 'cornflowerblue' for y in lol_4_assassin_mid_pick]
plt.figure(figsize = (10, 8))
ax = plt.subplot()

plt.bar(range(11), lol_4_assassin_mid_pick, color = colors)
for i, v in enumerate(lol_4_assassin_mid_pick):
    ax.text(i - 0.3, v + 0.001, str(v), size = 10)

plt.title("Assassin Pick % in Mid Lane")
plt.ylabel("Pick % in Proportion")

ax.set_xticks(range(11))
ax.set_xticklabels(['Akali' if (y == 0.0931) else '' for y in lol_4_assassin_mid_pick])

plt.savefig("assassin_pick_percent_mid_lane.png")
plt.show()
```



Based on the overall graph of Mid lane Assassins and their Pick %, Akali is also in the top 2 of being picked as a Mid lane Assassin. This suggests that Akali does really well in the Mid lane, therefore a lot of players will pick Akali if they choose to be an Assassin and be in the Mid lane.

Return to Tasks

2.3 Pick % of Alistar compared to his Ban %?

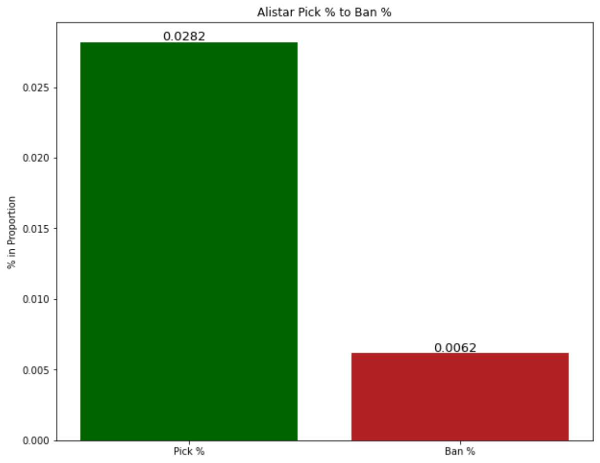
In [52]:
```
lol_4['Ban %'] = lol_4['Ban %'].str.rstrip('%').astype('float') / 100
```

In [53]:
```
lol_4_alistar = lol_4[lol_4['Name'] == 'Alistar']
lol_4_alistar.head()
```

Out[53]:

	Name	Class	Role	Tier	Score	Trend	Win %	Role %	Pick %	Ban %	KDA
6	Alistar	Tank	SUPPORT	B	42.58	-0.42	0.483	96.47%	0.0282	0.0062	2.46

In [54]:
```
lol_4_alistar_pick = lol_4_alistar['Pick %']
lol_4_alistar_ban = lol_4_alistar['Ban %']

lol_4_alistar_pick_ban = []
for pick, ban in zip(lol_4_alistar_pick, lol_4_alistar_ban):
    #print(pick)
    #print(ban)
    lol_4_alistar_pick_ban.append(pick)
    lol_4_alistar_pick_ban.append(ban)
#print(lol_4_alistar_pick_ban)


colors = ['darkgreen', 'firebrick']
plt.figure(figsize = (10, 8))
ax = plt.subplot()

plt.bar(range(2), lol_4_alistar_pick_ban, color = colors)

plt.title("Alistar Pick % to Ban %")
plt.ylabel("% in Proportion")

ax.set_xticks(range(2))
ax.set_xticklabels(['Pick %', 'Ban %'])
for i, v in enumerate(lol_4_alistar_pick_ban):
    ax.text(i - 0.1, v + 0.0001, str(v), size = 13)

plt.savefig("alistar_pick_ban_percent.png")
plt.show()
```



Looking at Alistar's Pick % to Ban %, it would seem like Alistar is picked exponentially more than being banned; however, the numbers only indicate that Alistar is picked only 2.8% of the time which is actually not a lot. So because the Pick % is so low for Alistar, so is the Ban % because 0.62%.

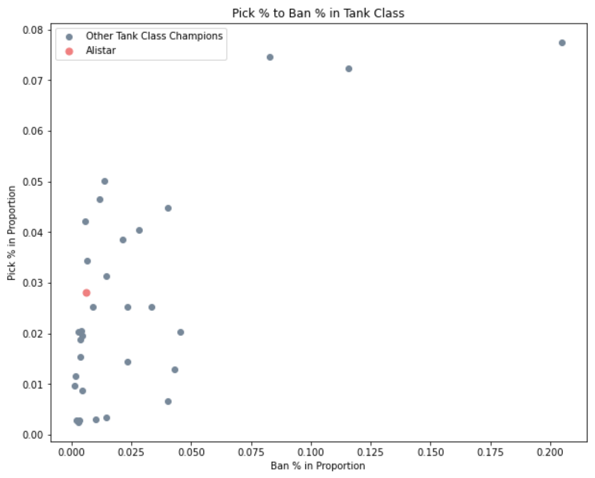
In [55]:
```
lol_4_tank = lol_4[lol_4['Class'] == 'Tank']
lol_4_tank.head()
```

Out[55]:

	Name	Class	Role	Tier	Score	Trend	Win %	Role %	Pick %	Ban %	KDA
6	Alistar	Tank	SUPPORT	B	42.58	-0.42	0.4830	96.47%	0.0282	0.0062	2.46
7	Amumu	Tank	JUNGLE	A	51.68	6.73	0.5297	87.85%	0.0314	0.0147	2.60
8	Amumu	Tank	SUPPORT	B	42.65	13.35	0.5114	19.12%	0.0035	0.0145	2.07
17	Blitzcrank	Tank	SUPPORT	S	59.84	-14.42	0.5216	97.42%	0.0775	0.2049	2.48
20	Braum	Tank	SUPPORT	C	40.10	-0.61	0.4712	96.85%	0.0206	0.0040	2.65

In [56]:

```
lol_4_tank_pick = lol_4_tank['Pick %'].values
#print(lol_4_tank_pick)

lol_4_tank_ban = lol_4_tank['Ban %'].values
#print(lol_4_tank_ban)

plt.figure(figsize = (10, 8))
plt.scatter(lol_4_tank_ban, lol_4_tank_pick, color = 'lightslategray', label = 'Other Tank Class Champions')
plt.scatter(lol_4_alistar_ban, lol_4_alistar_pick, color = 'lightcoral', label = 'Alistar', s = 50)

plt.title("Pick % to Ban % in Tank Class")
plt.ylabel("Pick % in Proportion")
plt.xlabel("Ban % in Proportion")

plt.legend()

plt.savefig("pick_ban_percent_tank_class.png")
plt.show()
```



The Pick % for Alistar (light red) in the Tank class is very low, nearly 3% of players pick Alistar to be a Tank; and because the Pick % is so low for Alister, the Ban % is pretty much non-existent.

In [57]:

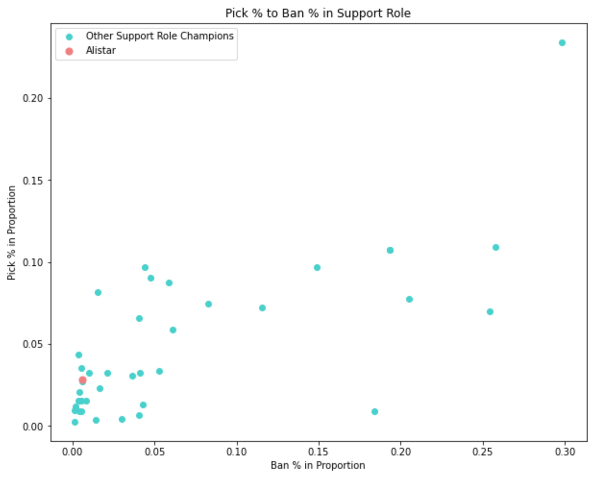
```
lol_4_support = lol_4[lol_4['Role'] == 'SUPPORT']
lol_4_support.head()
```

Out[57]:

	Name	Class	Role	Tier	Score	Trend	Win %	Role %	Pick %	Ban %	KDA
6	Alistar	Tank	SUPPORT	B	42.58	-0.42	0.4830	96.47%	0.0282	0.0062	2.46
8	Amumu	Tank	SUPPORT	B	42.65	13.35	0.5114	19.12%	0.0035	0.0145	2.07
10	Anivia	Mage	SUPPORT	C	35.06	3.87	0.4684	12.50%	0.0042	0.0298	2.12
16	Bard	Controller	SUPPORT	A	49.38	5.85	0.5104	95.01%	0.0270	0.0059	2.95
17	Blitzcrank	Tank	SUPPORT	S	59.84	-14.42	0.5216	97.42%	0.0775	0.2049	2.48

In [58]:

```
lol_4_support_pick = lol_4_support['Pick %'].values
#print(lol_4_support_pick)

lol_4_support_ban = lol_4_support['Ban %'].values
#print(lol_4_support_ban)

plt.figure(figsize = (10, 8))
plt.scatter(lol_4_support_ban, lol_4_support_pick, color = 'mediumturquoise', label = 'Other Support Role Champions')
plt.scatter(lol_4_alistar_ban, lol_4_alistar_pick, color = 'lightcoral', label = 'Alistar', s = 50)

plt.title("Pick % to Ban % in Support Role")
plt.ylabel("Pick % in Proportion")
plt.xlabel("Ban % in Proportion")

plt.legend()

plt.savefig("pick_ban_percent_support_role.png")
plt.show()
```



Just like the graph on the Tank class, the Pick % to Ban % in the Support role is relatively small in both for Alistar. This means that Alistar is picked about 2 - 3% of the time to be in the Support lane, and because the Pick % is so small already, Alistar is rarely ever banned (which is why the Ban % is so low).

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2.4 Akshan's Role % of Top Lane and Mid Lane?

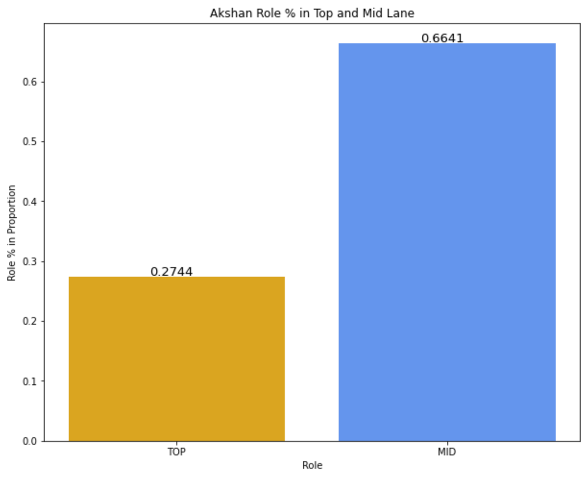
In [61]:
```
lol_4['Role %'] = lol_4['Role %'].str.rstrip('%').astype('float') / 100
```

In [62]:
```
lol_4_akshan = lol_4[lol_4['Name'] == "Akshan"]
lol_4_akshan.head()
```

Out[62]:

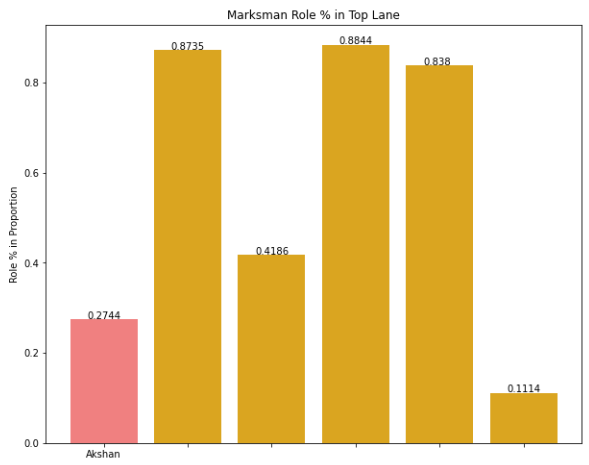
	Name	Class	Role	Tier	Score	Trend	Win %	Role %	Pick %	Ban %	KDA
4	Akshan	Marksman	MID	A	51.30	-3.12	0.4925	0.6641	0.0444	0.159	2.14
5	Akshan	Marksman	TOP	B	47.16	6.59	0.5285	0.2744	0.0175	0.159	1.93

In [72]:
```
lol_4_akshan_top = lol_4_akshan[lol_4_akshan['Role'] == 'TOP']
lol_4_akshan_top_role = lol_4_akshan_top['Role %'].values
#print(lol_4_akshan_top_role)

lol_4_akshan_mid = lol_4_akshan[lol_4_akshan['Role'] == 'MID']
lol_4_akshan_mid_role = lol_4_akshan_mid['Role %'].values
#print(lol_4_akshan_mid_role)

lol_4_akshan_role = []
for top, mid in zip(lol_4_akshan_top_role, lol_4_akshan_mid_role):
    lol_4_akshan_role.append(round(top, 4))
    lol_4_akshan_role.append(round(mid, 4))
#print(lol_4_akshan_role)



colors = ['goldenrod', 'cornflowerblue']
plt.figure(figsize = (10, 8))
ax = plt.subplot()

plt.bar(range(2), lol_4_akshan_role, color = colors)

plt.title("Akshan Role % in Top and Mid Lane")
plt.ylabel("Role % in Proportion")
plt.xlabel("Role")

ax.set_xticks(range(2))
ax.set_xticklabels(['TOP', 'MID'])
for i, v in enumerate(lol_4_akshan_role):
    ax.text(i - 0.1, v + 0.001, str(v), size = 13)

plt.savefig("akshan_role_percent.png")
plt.show()
```



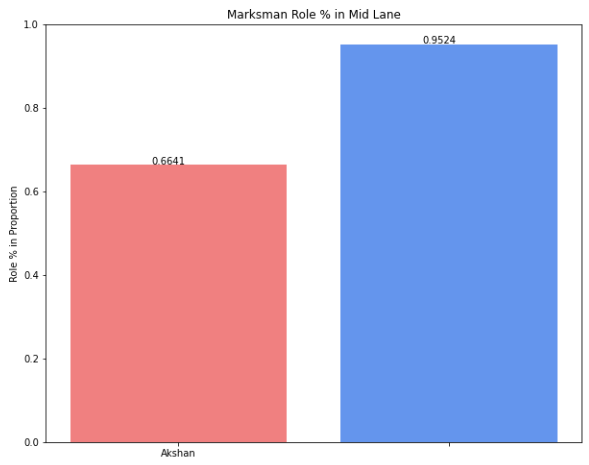
Based off this graph, if the player had to choose Akshan as their champion, they would have a better chance of doing relatively well in the game if they chose Akshan as a Mid laner rather than a Top laner.

In [76]:
```
lol_4_marksman = lol_4[lol_4['Class'] == 'Marksman']
lol_4_marksman_top = lol_4_marksman[lol_4_marksman['Role'] == 'TOP']
lol_4_marksman_top_role = lol_4_marksman_top['Role %'].values
lol_4_marksman_top_role = [ round(x, 4) for x in lol_4_marksman_top_role ]
#print(lol_4_marksman_top_role)
#print(len(lol_4_marksman_top_role))

colors = ['lightcoral' if (y == 0.2744) else 'goldenrod' for y in lol_4_marksman_top_role]
plt.figure(figsize = (10, 8))
ax = plt.subplot()

plt.bar(range(len(lol_4_marksman_top_role)), lol_4_marksman_top_role, color = colors)
for i, v in enumerate(lol_4_marksman_top_role):
    ax.text(i - 0.2, v + 0.001, str(v), size = 10)

plt.title("Marksman Role % in Top Lane")
plt.ylabel("Role % in Proportion")

ax.set_xticks(range(len(lol_4_marksman_top_role)))
ax.set_xticklabels(['Akshan' if (y == 0.2744) else '' for y in lol_4_marksman_top_role])

plt.savefig("marksman_role_percent_top_lane.png")
plt.show()
```



In this graph 'Marksman Role % in Top Lane', Akshan (light red) is part of the bottom 2 to be chosen for this role. This means that the top 3 Marksman would be better options as a Top laner than Akshan would be.

In [92]:
```
lol_4_marksman_mid = lol_4_marksman[lol_4_marksman['Role'] == 'MID']
lol_4_marksman_mid_role = lol_4_marksman_mid['Role %'].values
lol_4_marksman_mid_role = [ round(x, 4) for x in lol_4_marksman_mid_role ]
#print(lol_4_marksman_mid_role)
#print(len(lol_4_marksman_mid_role))


colors = ['lightcoral' if (y == 0.6641) else 'cornflowerblue' for y in lol_4_marksman_mid_role]
plt.figure(figsize = (10, 8))
ax = plt.subplot()

plt.bar(range(len(lol_4_marksman_mid_role)), lol_4_marksman_mid_role, color = colors)
for i, v in enumerate(lol_4_marksman_mid_role):
    ax.text(i - 0.1, v + 0.001, str(v), size = 10)

plt.title("Marksman Role % in Mid Lane")
plt.ylabel("Role % in Proportion")

ax.set_xticks(range(len(lol_4_marksman_mid_role)))
ax.set_xticklabels(['Akshan' if (y == 0.6641) else '' for y in lol_4_marksman_mid_role])

plt.savefig("marksman_role_percent_mid_lane.png")
plt.show()
```



As you can see from the 'Marksman Role % in Mid Lane', there is only one other Marksman as a Mid laner other than Akshan; and based off this graph, the other Marksman champion is picked to be as a Mid laner more than Akshan.

Return to Tasks

2.5 Ekko's Higher KDA In Jungle Lane or Mid Lane?

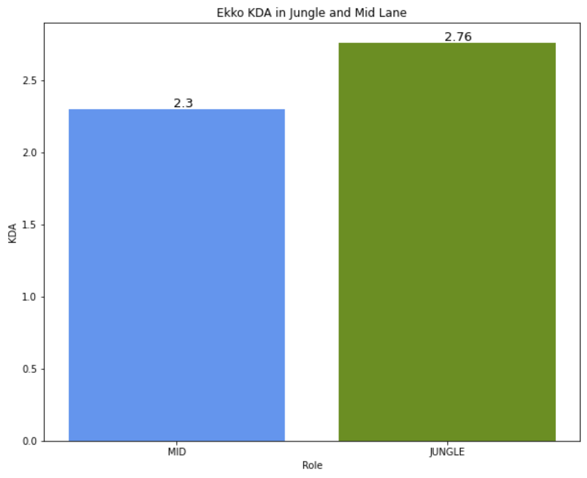
In [82]:
```
lol_4_ekko = lol_4[lol_4['Name'] == 'Ekko']
lol_4_ekko.head()
```

Out[82]:

	Name	Class	Role	Tier	Score	Trend	Win %	Role %	Pick %	Ban %	KDA
33	Ekko	Assassin	JUNGLE	S	59.62	5.13	0.5195	0.6438	0.057	0.0346	2.76
34	Ekko	Assassin	MID	A	47.82	1.87	0.5066	0.3384	0.029	0.0346	2.30

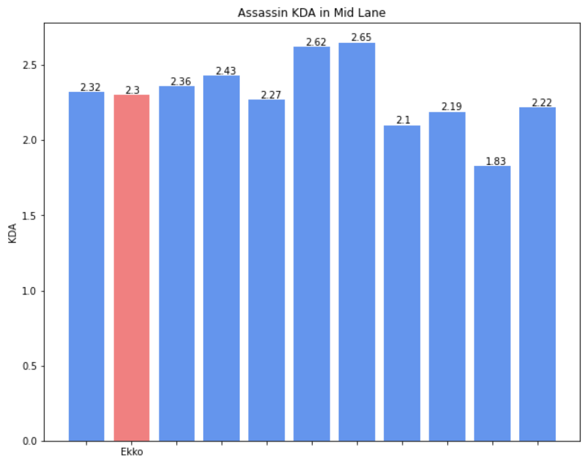
In [89]:
```
lol_4_ekko_jungle = lol_4_ekko[lol_4_ekko['Role'] == 'JUNGLE']
lol_4_ekko_jungle_kda = lol_4_ekko_jungle['KDA'].values
#print(lol_4_ekko_jungle_kda)

lol_4_ekko_mid = lol_4_ekko[lol_4_ekko['Role'] == 'MID']
lol_4_ekko_mid_kda = lol_4_ekko_mid['KDA'].values
#print(lol_4_ekko_mid_kda)

lol_4_ekko_kda = []
for mid, jungle in zip(lol_4_ekko_mid_kda, lol_4_ekko_jungle_kda):
    lol_4_ekko_kda.append(mid)
    lol_4_ekko_kda.append(jungle)
#print(lol_4_ekko_kda)


colors = ['cornflowerblue', 'olivedrab']
plt.figure(figsize = (10, 8))
ax = plt.subplot()

plt.bar(range(len(lol_4_ekko_kda)), lol_4_ekko_kda, color = colors)

plt.title("Ekko KDA in Jungle and Mid Lane")
plt.ylabel("KDA")
plt.xlabel("Role")
```

```
ax.set_xticks(range(len(lol_4_ekko_kda)))
ax.set_xticklabels(['MID', 'JUNGLE'])
for i, v in enumerate(lol_4_ekko_kda):
    ax.text(i - 0.01, v + 0.01, str(v), size = 13)

plt.savefig("ekko_kda_mid_jungle.png")
plt.show()
```



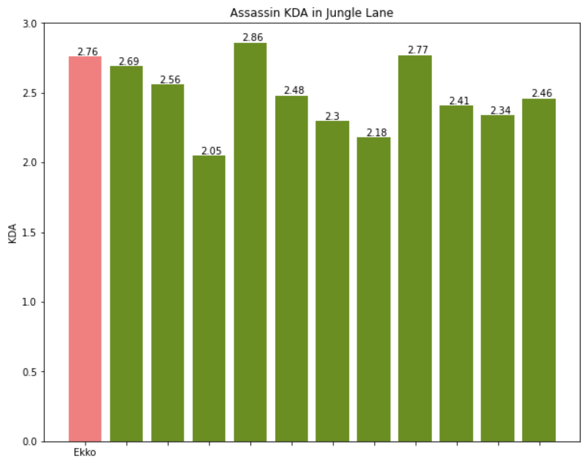
Comparing Ekko's Mid lane KDA, and Jungle lane KDA; Ekko's Jungle KDA is much higher, meaning it would be more worth it to pick Ekko if the player wanted to choose an Assassin, and be a Jungle laner.

In [98]:
```
lol_4_assassin_mid = lol_4_assassin[lol_4_assassin['Role'] == 'MID']
lol_4_assassin_mid_kda = lol_4_assassin_mid['KDA'].values
#print(lol_4_assassin_mid_kda)
#print(len(lol_4_assassin_mid_kda))


colors = ['lightcoral' if (y == 2.3) else 'cornflowerblue' for y in lol_4_assassin_mid_kda]
plt.figure(figsize = (10, 8))
ax = plt.subplot()

plt.bar(range(len(lol_4_assassin_mid_kda)), lol_4_assassin_mid_kda, color = colors)
for i, v in enumerate(lol_4_assassin_mid_kda):
    ax.text(i - 0.15, v + 0.01, str(v), size = 10)

plt.title("Assassin KDA in Mid Lane")
plt.ylabel("KDA")

ax.set_xticks(range(len(lol_4_assassin_mid_kda)))
ax.set_xticklabels(['Ekko' if (y == 2.3) else '' for y in lol_4_assassin_mid_kda])

plt.savefig("assassin_kda_mid_lane.png")
plt.show()
```



The 'Assassin KDA in Mid Lane' graph takes all the Assassins in the Mid Lane and compares all their KDAs. In this graph, Ekko (light red) has a relatively average KDA score compared to the rest of the graph. Ekko might not be the best pick as a Mid Lane Assassin as there are higher KDA scores.

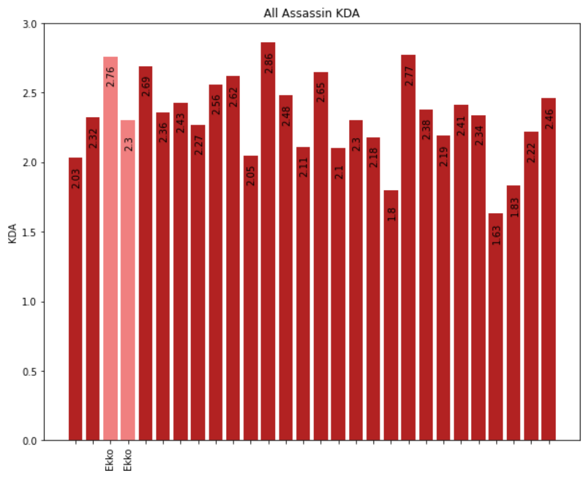
In [101…
```
lol_4_assassin_jungle = lol_4_assassin[lol_4_assassin['Role'] == 'JUNGLE']
lol_4_assassin_jungle_kda = lol_4_assassin_jungle['KDA'].values
#print(lol_4_assassin_jungle_kda)
#print(len(lol_4_assassin_jungle_kda))


colors = ['lightcoral' if (y == 2.76) else 'olivedrab' for y in lol_4_assassin_jungle_kda]
plt.figure(figsize = (10, 8))
ax = plt.subplot()

plt.bar(range(len(lol_4_assassin_jungle_kda)), lol_4_assassin_jungle_kda, color = colors)
for i, v in enumerate(lol_4_assassin_jungle_kda):
    ax.text(i - 0.2, v + 0.01, str(v), size = 10)

plt.title("Assassin KDA in Jungle Lane")
plt.ylabel("KDA")

ax.set_xticks(range(len(lol_4_assassin_jungle_kda)))
ax.set_xticklabels(['Ekko' if (y == 2.76) else '' for y in lol_4_assassin_jungle_kda])

plt.savefig("assassin_kda_jungle_lane.png")
plt.show()
```



The 'Assassin KDA in Jungle Lane' graph looks at all the Assassins in the Jungle lane and compares the KDA. Ekko has a relatively high KDA score (top 3) compared to the rest of the Assassins.

In [117…

```
lol_4_assassin_name = lol_4_assassin['Name'].values
lol_4_assassin_kda = lol_4_assassin['KDA'].values
#print(lol_4_assassin_kda)
#print(len(lol_4_assassin_kda))



colors = ['lightcoral' if (y == 'Ekko') else 'firebrick' for y in lol_4_assassin_name]
plt.figure(figsize = (10, 8))
ax = plt.subplot()

plt.bar(range(len(lol_4_assassin_kda)), lol_4_assassin_kda, color = colors)
for i, v in enumerate(lol_4_assassin_kda):
    ax.text(i - 0.2, v - 0.2, str(v), size = 10, rotation = 90)

plt.title("All Assassin KDA")
plt.ylabel("KDA")

ax.set_xticks(range(len(lol_4_assassin_kda)))
ax.set_xticklabels(['Ekko' if (y == 'Ekko') else '' for y in lol_4_assassin_name], rotation = 90)

plt.savefig("all_assassin_kda.png")
plt.show()
```



This 'All Assassin KDA' graph compares all the Assassin's KDA to Ekko's KDA results regardless of the lane/role.

Based off all 4 graphs, Ekko has a relatively good KDA score for both the Mid and Jungle lane (with Jungle lane being better). This would suggest that if the champion Ekko were to be picked, the player would have a higher chance of winning if Ekko was in the Jungle lane.

Return to Tasks

---

3. Possibilites and Assumptions:

3.1 Find the Average KDA for All Classes, and Compare to the Average KDA of Tank class.

Let's look at the Statistics of the Tank Class' KDA first.

In [81]:

```
lol_4_tank = lol_4[lol_4['Class'] == 'Tank']
#lol_4_tank.head()

lol_4_tank_kda = lol_4_tank['KDA'].values
```

In [92]:

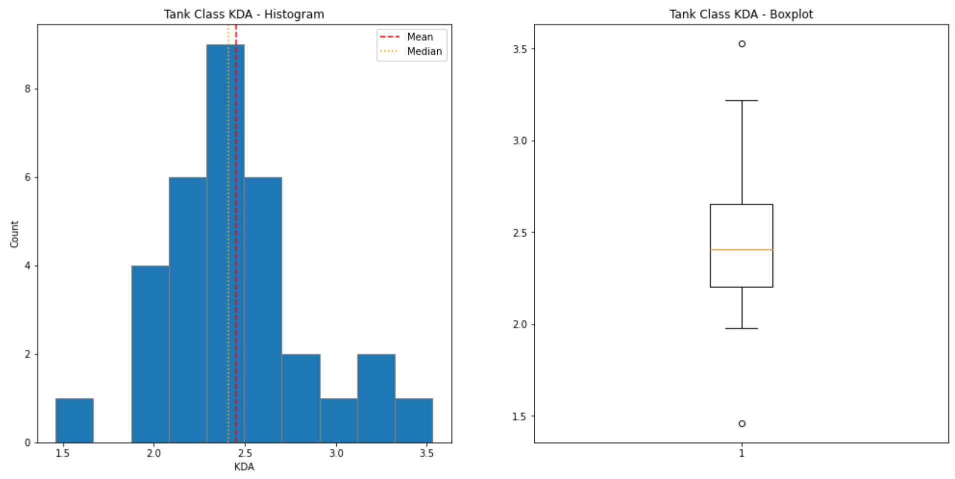
```
print("Tank Class Data:")
print("")

lol_4_kda_std = np.std(lol_4['KDA'].values)
#print(lol_4_kda_std)

lol_4_tank_kda_avg = lol_4_tank_kda.mean()
print("Mean: " + str(lol_4_tank_kda_avg))

lol_4_tank_std = np.std(lol_4_tank_kda, ddof = 1)
print("Standard Deviation: " + str(lol_4_tank_std))

lol_4_tank_std_error = lol_4_kda_std / (len(lol_4_tank_kda) ** 0.5)
print("Standard Error: " + str(lol_4_tank_std_error))
```

```
lol_4_tank_95_percentile = np.percentile(lol_4_tank_kda, [2.5, 97.5]) #this finds 95% within the graph
#print(lol_4_tank_95_percentile)
print("This shows that 95% of the graph for Tank class has KDA between 1.863 to 3.28975")

print("")

lol_4_tank_first_quartile = np.quantile(lol_4_tank_kda, 0.25)
print("Q1: " + str(lol_4_tank_first_quartile))

lol_4_tank_second_quartile = np.quantile(lol_4_tank_kda, 0.50)
print("Q2: " + str(lol_4_tank_second_quartile))

lol_4_tank_third_quartile = np.quantile(lol_4_tank_kda, 0.75)
print("Q3: " + str(lol_4_tank_third_quartile))

lol_4_tank_interquartile = iqr(lol_4_tank_kda)
print("Interquartile Range: " + str(lol_4_tank_interquartile))

lol_4_tank_lower = lol_4_tank_first_quartile - (1.5 * lol_4_tank_interquartile)
print("Lower Fence: " + str(lol_4_tank_lower))

lol_4_tank_upper = lol_4_tank_third_quartile + (1.5 * lol_4_tank_interquartile)
print("Upper Fence: " + str(lol_4_tank_upper))
```

```
Tank Class Data:

Mean: 2.4521875
Standard Deviation: 0.405014809565949
Standard Error: 0.071514178610587
This shows that 95% of the graph for Tank class has KDA between 1.863 to 3.28975

Q1: 2.2025
Q2: 2.41
Q3: 2.655
Interquartile Range: 0.4524999999999997
Lower Fence: 1.5237500000000006
Upper Fence: 3.3337499999999993
```

In [151…

```
plt.figure(figsize = (17, 8))
ax1 = plt.subplot(1, 2, 1)
plt.hist(lol_4_tank_kda, edgecolor = 'gray')
plt.axvline(lol_4_tank_kda_avg, color = 'red', linestyle = 'dashed', label = 'Mean')
plt.axvline(lol_4_tank_second_quartile, color = 'orange', linestyle = 'dotted', label = 'Median')

ax1.set_title("Tank Class KDA - Histogram")
plt.xlabel("KDA")
plt.ylabel("Count")
plt.legend()


ax2 = plt.subplot(1, 2, 2)
plt.boxplot(lol_4_tank_kda)

ax2.set_title("Tank Class KDA - Boxplot")

plt.savefig("tank_kda_histogram_boxplot.png")
plt.show()

print("Plots are slightly skewed right because the mean is larger an the median")
```



```
Plots are slightly skewed right because the mean is larger an the median
```

In [96]:

```
lol_4_kda = lol_4['KDA'].values
#print(lol_4_kda)

lol_4_kda_avg = lol_4_kda.mean()
print(lol_4_kda_avg)
```

```
2.311071428571428
```

We want to know if the average KDA for the Tank Class is 2.311 or not.

$H_0 : \mu = 2.311$

$H_1 : \mu \neq 2.311$

In [97]:

```
tstat, pval = ttest_1samp(lol_4_tank_kda, 2.311)
print("p-value: " + str(pval))
```

```
p-value: 0.05759229868996925
```

The p-value describes the the likelihood of seeing the sample mean (2.45) over the population mean (2.311). Since the p-value is greater than 0.05 at 0.058, we will not reject the null hypothesis. This means that there is about 5.8 chances out of 100 that the mean is 2.311.

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3.2 Association Between Roles and Classes?

We want to see if there's an association between the classes, and the type of roles they are in.

H_0 : association between roles and classes

H_1 : no association between roles and classes

In [98]:

```
table = pd.crosstab(lol_4['Class'], lol_4['Role'])
```

```
print(table)
```

```
Role        ADC  JUNGLE  MID  SUPPORT  TOP
Class
Assassin      0      12   11        2    3
Controller    0       1    1       10    0
Fighter       2      21    7        1   34
Mage          5       4   30       13    4
Marksman     20       2    2        1    6
Tank          0       7    3       12   10
```

In [104…

```
chi2, pval, dof, expected = chi2_contingency(table)
print("p-value: {:.39f}".format(float(pval)))
```

```
p-value: 0.000000000000000000000000000000000001310
```

As we can see from the p-value above, the null hypothesis is rejected, and the value is statistically significant. This would suggest that there is absolutely no association between the types of roles and classes.

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3.3 In the Support Lane, is it more likely for a Mage or Tank to be picked?

Let's first find the Baseline Conversion Rate, Minimum Detectable Effect, and Significance Threshold for the Mage class.

In [116…

```
lol_4_support = lol_4[lol_4['Role'] == 'SUPPORT']
lol_4_support.head()
#print(len(lol_4_support))

lol_4_support_mage = lol_4_support[lol_4_support['Class'] == 'Mage']
#print(len(lol_4_support_mage))


baseline = ((len(lol_4_support_mage) / len(lol_4_support)) * 100)
print("Baseline: " + str(round(baseline, 4)) + "%")
```

```
Baseline: 33.3333%
```

Suppose that 33.3333% of players will choose the Mage class to be in the Support lane, so we are thinking of creating a couple more Mage champions for the Support lane, but it may be worth to do if at least 35% of players were to choose Mage champions in the Support role.

In [115…

```
#baseline = 33.3333%
new_baseline = 35 #35%

min_detectable_effect = (((new_baseline - baseline) / baseline) * 100)
print("Minimum Detectable Effect: " + str(round(min_detectable_effect, 4)) + "%")
```

```
Minimum Detectable Effect: 5.0%
```

This significance threshold is the false positive rate for the test. 95% is the most common to use, therefore, we will use it too.

Through an external sample size calculator for this A/B Test, we will need at least **11,000 players**. Now, to get the probabilities of players that will pick either Mage or Tank in the 12.4 patch, we will need to take the number of Mage champions in Support, and divide it by the total number of Support roles (this is the baseline); and do the same with the Tank champions as well.

In [124…

```
lol_4_support_tank = lol_4_support[lol_4_support['Class'] == 'Tank']
lol_4_support_tank_prob = ((len(lol_4_support_tank) / len(lol_4_support)) * 100)

print("Percent of Mage Champions in Support: " + str(round(baseline)) + "%")
print("Percent of Tank Champions in Support: " + str(round(lol_4_support_tank_prob)) + "%")
```

```
Percent of Mage Champions in Support: 33%
Percent of Tank Champions in Support: 31%
```

We can now use the probabilites to simulate a dataset of 11,000 players:

In [127…

```
sample_support_mage = np.random.choice(['Yes', 'No'], size = 5500, p = [0.33, 0.67])
sample_support_tank = np.random.choice(['Yes', 'No'], size = 5500, p = [0.31, 0.69])


group = ['Mage'] * 5500 + ['Tank'] * 5500
outcome = list(sample_support_mage) + list(sample_support_tank)

sim_data = {"Class": group, "Chosen?" : outcome}
sim_data = pd.DataFrame(sim_data)
sim_data.head()
```

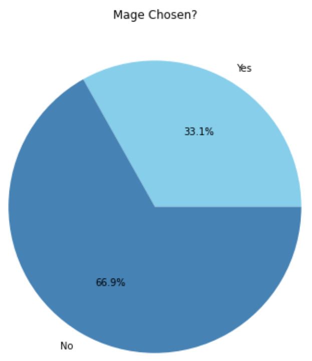
Out[127…

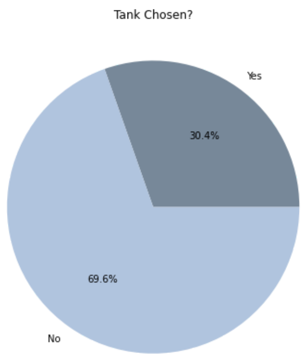
	Class	Chosen?
0	Mage	No
1	Mage	No
2	Mage	Yes
3	Mage	No
4	Mage	Yes

Let's see what the simulated data looks like in a pie chart and histogram so we can see how many players would choose Mage or Tank, theoretically.

In [152…

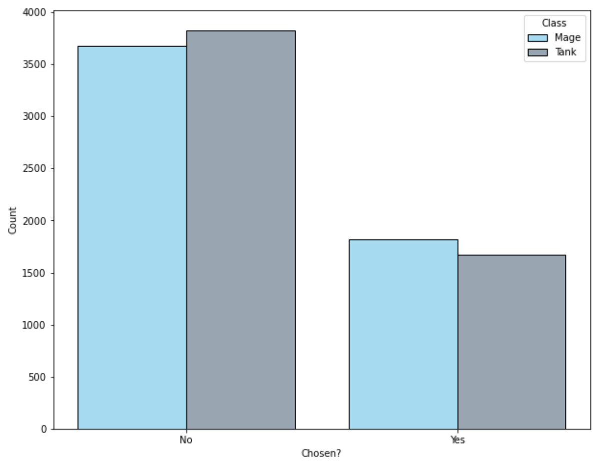
```
sim_data_mage = sim_data[sim_data['Class'] == 'Mage']
sim_data_mage_chosen = sim_data_mage[sim_data_mage['Chosen?'] == 'Yes']
#print(len(sim_data_mage_chosen))
sim_data_mage_not_chosen = sim_data_mage[sim_data_mage['Chosen?'] == 'No']

sim_data_tank = sim_data[sim_data['Class'] == 'Tank']
sim_data_tank_chosen = sim_data_tank[sim_data_tank['Chosen?'] == 'Yes']
#print(len(sim_data_tank_chosen))
sim_data_tank_not_chosen = sim_data_tank[sim_data_tank['Chosen?'] == 'No']


plt.figure(figsize = (15, 8))
ax1 = plt.subplot(1, 2, 1)
plt.pie([len(sim_data_mage_chosen), len(sim_data_mage_not_chosen)], labels = ['Yes', 'No'], autopct = '%0.1f%%',
        colors = ['skyblue', 'steelblue'])
plt.title("Mage Chosen?")

ax2 = plt.subplot(1, 2, 2)
plt.pie([len(sim_data_tank_chosen), len(sim_data_tank_not_chosen)], labels = ['Yes', 'No'], autopct = '%0.1f%%',
        colors = ['lightslategray', 'lightsteelblue'])
plt.title("Tank Chosen?")

plt.savefig("mage_tank_chosen.png")
plt.show()
```





In [153…

```
plt.figure(figsize = (10, 8))
sns.histplot(data = sim_data, x = 'Chosen?', hue = 'Class', multiple = 'dodge', shrink = 0.8, palette = ['#87ceeb', '#778899'])

plt.savefig('mage_tank_chosen_histogram.png')
plt.show()
```



So we can see that with running the A/B test, it is more likely that choosing either a Mage or Tank in the support class will be 'No'; however, the Mage is more likely to get chosen over the Tank if in a Support role. Therefore, it may not be worth it to create new Mage champions in the Support class as they're not likely to get chosen.

Return to Tasks

3.4 Different Types of Classes Better than One Another Based on Scores?

The independent variable is class type, which has 'Fighter', 'Assassin', 'Mage', 'Marksman', 'Controller', and 'Tank'; and we want to find out if there's a difference in score.

H_0 : there is no difference to the population mean

H_1 : there is at least one class that differs significantly from the overall mean

In [149…

```
lol_4_fighter = lol_4[lol_4['Class'] == 'Fighter']
lol_4_fighter_scores = lol_4_fighter['Score'].values

lol_4_assassin = lol_4[lol_4['Class'] == 'Assassin']
lol_4_assassin_scores = lol_4_assassin['Score'].values

lol_4_mage = lol_4[lol_4['Class'] == 'Mage']
lol_4_mage_scores = lol_4_mage['Score'].values

lol_4_marksman = lol_4[lol_4['Class'] == 'Marksman']
lol_4_marksman_scores = lol_4_marksman['Score'].values

lol_4_controller = lol_4[lol_4['Class'] == 'Controller']
lol_4_controller_scores = lol_4_controller['Score'].values

lol_4_tank = lol_4[lol_4['Class'] == 'Tank']
lol_4_tank_scores = lol_4_tank['Score'].values


fstat, pval = f_oneway(lol_4_fighter_scores, lol_4_assassin_scores, lol_4_mage_scores, lol_4_marksman_scores,
                       lol_4_controller_scores, lol_4_tank_scores)
print("p-value: " + str(pval))
```

```
p-value: 0.17958878647853557
```

Due to the p-value being greater than 0.05, we will not reject the null hypothesis. This means that each of the classes' scores are similar to the overall population mean.

Return to Tasks

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[1] Description about League of Legends was created by *Wikipedia*.

[2] Class descriptions are from *Dignitas: Classifying Classes - A Guide to Understanding Champion Classes in League of Legends*.

[3] Lane/Role descriptions are from *League of Legends Wiki*.

[4] Dataset patches 12.1, 12.2, and 12.3 is created by Vivo Vinco; which was retrieved from *Kaggle*. Dataset patch 12.4 was retrieved from *MetaSrc*. These datasets include all ranks.

In [ ]: