An Analysis of Dungeons and Dragons 5ed Monsters

Using data found from Patrick Gomes at Kaggle I will look to see if I can answer a few questions regarding the diversity of monsters in Dungeons and Dragons Fifth Edition (to be called 5e for the remainder of this project). I will pose the following questions:

1. What are the most common monster types (shown as race in this data)?

2. Is there any connection between monster type and alignment?

3. What does the spread of alignment look like for an individual monster race?

4. Does monster size impact hit point amounts?

5. Does a monster's armor class have a correlation with its hit points?

In [2]:
```
#import libraries used for data analysis
import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
import seaborn as sns
from matplotlib.markers import MarkerStyle
```

In [3]:
```
#read in the CSV file and see a preview of the data
dnd = pd.read_csv('Dd5e_monsters.csv')
dnd.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 324 entries, 0 to 323
Data columns (total 7 columns):
 #   Column                  Non-Null Count  Dtype 
---  ------                  --------------  ----- 
 0   Name                    324 non-null    object
 1   Size                    324 non-null    object
 2   Race + alignment        324 non-null    object
 3   HP                      324 non-null    object
 4   Armor                   324 non-null    object
 5   Speed                   324 non-null    object
 6   Challenge rating  (XP)  324 non-null    object
dtypes: object(7)
memory usage: 17.8+ KB
```

In [4]:
```
#look over the columns names and first three rows worth of data
dnd.head(3)
```

Out[4]:

	Name	Size	Race + alignment	HP	Armor	Speed	Challenge rating (XP)
0	Aboleth	Large	aberration, Lawful Evil	135 (18d10+36)	17 (Natural Armor)	10 ft., swim 40 ft.	10 (5,900 XP)
1	Acolyte	Medium	humanoid (any race), Any Alignment	9 (2d8)	10	30 ft.	1/4 (50 XP)
2	Adult Black Dragon	Huge	dragon, Chaotic Evil	195 (17d12+85)	19 (Natural Armor)	40 ft., fly 80 ft., swim 40 ft.	14 (11,500 XP)

In [5]:
```
#Check for any null values even those this data set looks pretty clean at a glance
dnd.isnull().sum()
```

Out[5]:
```
Name                    0
Size                    0
Race + alignment        0
HP                      0
Armor                   0
Speed                   0
Challenge rating  (XP)    0
dtype: int64
```

What are the most common monster types (shown as race in this data)?

To work on this question I plan on splitting up Race+Alignment into two separate columns

In [6]:
```
# found that some of the data had multiple commas, so starting from the end of the
dnd[['Race','Alignment']] = dnd['Race + alignment'].str.rsplit(',', n=1, expand=Tru
```

```
dnd['Alignment'] = dnd['Alignment'].str.strip()
```

In [7]:
```
# Let's also clean up some of the other columns for future discussion.
dnd['Armor'] = dnd['Armor'].apply(lambda x: int(x.split(' (')[0]))
dnd['HP'] = dnd['HP'].apply(lambda x: int(x.split(' (')[0]))
```

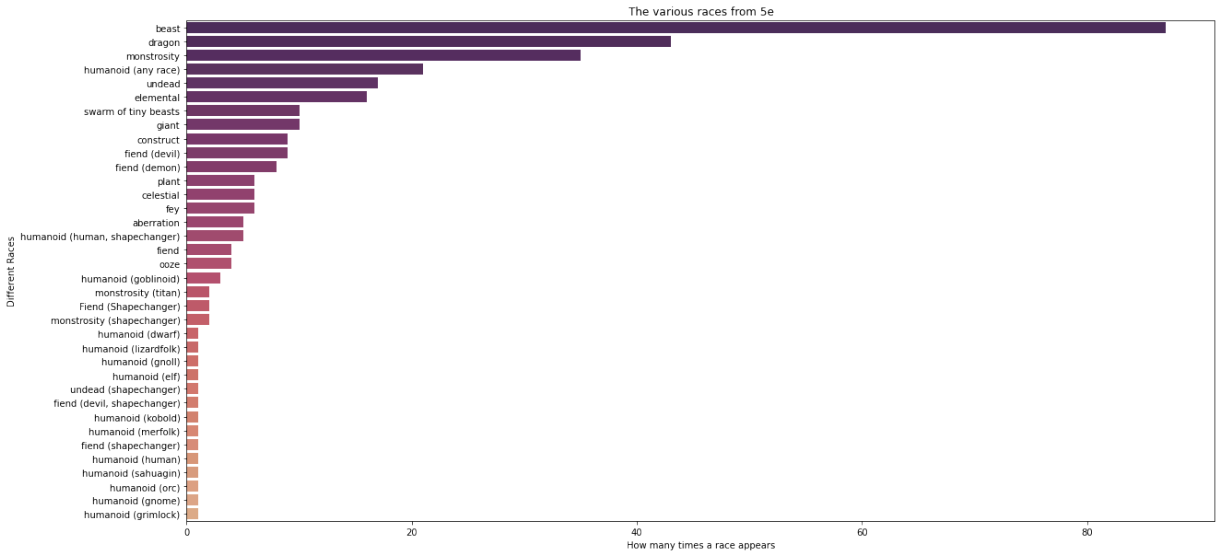
In [8]:
```
dnd = dnd.drop(['Race + alignment', 'Challenge rating  (XP)'], axis=1)
```

In [9]:
```
dnd.head()
```

Out[9]:

	Name	Size	HP	Armor	Speed	Race	Alignment
0	Aboleth	Large	135	17	10 ft., swim 40 ft.	aberration	Lawful Evil
1	Acolyte	Medium	9	10	30 ft.	humanoid (any race)	Any Alignment
2	Adult Black Dragon	Huge	195	19	40 ft., fly 80 ft., swim 40 ft.	dragon	Chaotic Evil
3	Adult Blue Dragon	Huge	225	19	40 ft., burrow 30 ft., fly 80 ft.	dragon	Lawful Evil
4	Adult Brass Dragon	Huge	172	18	40 ft., burrow 40 ft., fly 80 ft.	dragon	Chaotic Good

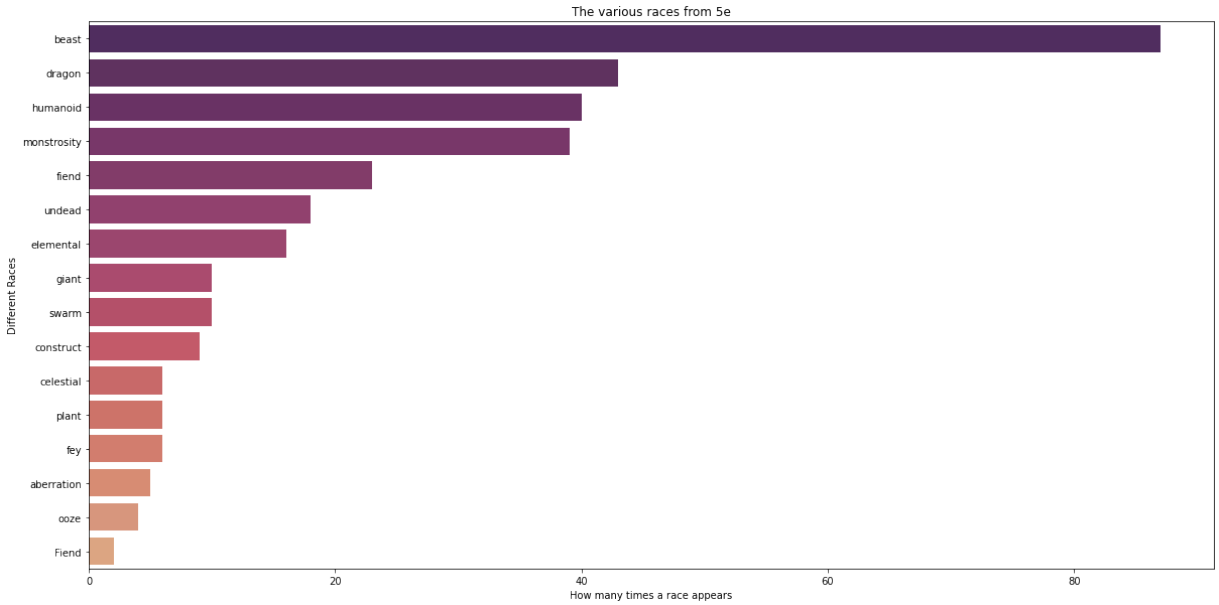
In [10]:
```
# Plotting out a graph to show the monsters. A lot of humanoid variants.
different_races_count = dnd['Race'].value_counts()
different_races = dnd['Race'].value_counts().keys()

fig, ax = plt.subplots(figsize=(20,10))

sns.barplot(ax=ax, x=different_races_count, y=different_races, palette='flare_r',da
plt.title('The various races from 5e')
plt.xlabel('How many times a race appears')
plt.ylabel('Different Races')
plt.show()
```



Even if we combined all of the humanoid variants, the number of Beasts surpasses all other individual races by double. Let's try and combine the races into fewer categories.

In [11]:
```
# combine all races to their main categories so the data looks more in sync.
dnd['Race'] = dnd['Race'].apply(lambda x: x.split(' ')[0])
```

In [37]:
```
different_races_count = dnd['Race'].value_counts()
different_races = dnd['Race'].value_counts().keys()

fig, ax = plt.subplots(figsize=(20,10))

sns.barplot(ax=ax, x=different_races_count, y=different_races, palette='flare_r',da
plt.title('The various races from 5e')
plt.xlabel('How many times a race appears')
plt.ylabel('Different Races')


# plt.savefig('graphs/races_of_5e.jpg', bbox_inches = 'tight', edgecolor='w')
```



As we can see from the chart beasts are the most prevalent race in 5e, with Dragons, Humanoids (of varying types), and Monstrosities making up the next bulk of monsters.

In [13]:
```
dnd.head()
```

Out[13]:

	Name	Size	HP	Armor	Speed	Race	Alignment
0	Aboleth	Large	135	17	10 ft., swim 40 ft.	aberration	Lawful Evil
1	Acolyte	Medium	9	10	30 ft.	humanoid	Any Alignment
2	Adult Black Dragon	Huge	195	19	40 ft., fly 80 ft., swim 40 ft.	dragon	Chaotic Evil
3	Adult Blue Dragon	Huge	225	19	40 ft., burrow 30 ft., fly 80 ft.	dragon	Lawful Evil
4	Adult Brass Dragon	Huge	172	18	40 ft., burrow 40 ft., fly 80 ft.	dragon	Chaotic Good

Is there any connection between monster type and alignment?

In [14]:
```
# Get an idea for which alignments we are looking at in the data
dnd['Alignment'].value_counts()
```

Out[14]:
```
Unaligned                                 128
Chaotic Evil                               44
Lawful Evil                                37
Neutral Evil                               28
Lawful Good                                19
Neutral                                    19
Any Alignment                              15
Chaotic Good                               12
Neutral Good                                6
Any Non-good Alignment                      4
Lawful Neutral                              3
Chaotic Neutral                             3
Any Non-lawful Alignment                    2
Neutral Good (50%) Or Neutral Evil (50%)    1
Any Chaotic Alignment                       1
Any                                         1
Any Evil Alignment                          1
Name: Alignment, dtype: int64
```

There are 9 alignments (and unaligned) that we care about, so let's take a look at just the basic alignments

In [15]:
```
# creating a list of the alignments we care to look over.
alignments = ['Unaligned',
              'Chaotic Evil', 'Lawful Evil', 'Neutral Evil',
              'Chaotic Good', 'Lawful Good', 'Neutral Good',
              'Neutral', 'Chaotic Neutral', 'Lawful Neutral']

# this function will create a new column of 0/1 values so we narrow down our alignm
dnd['True Alignment'] = dnd['Alignment'].apply(lambda alignment: 1 if alignment in
dnd.head()
```

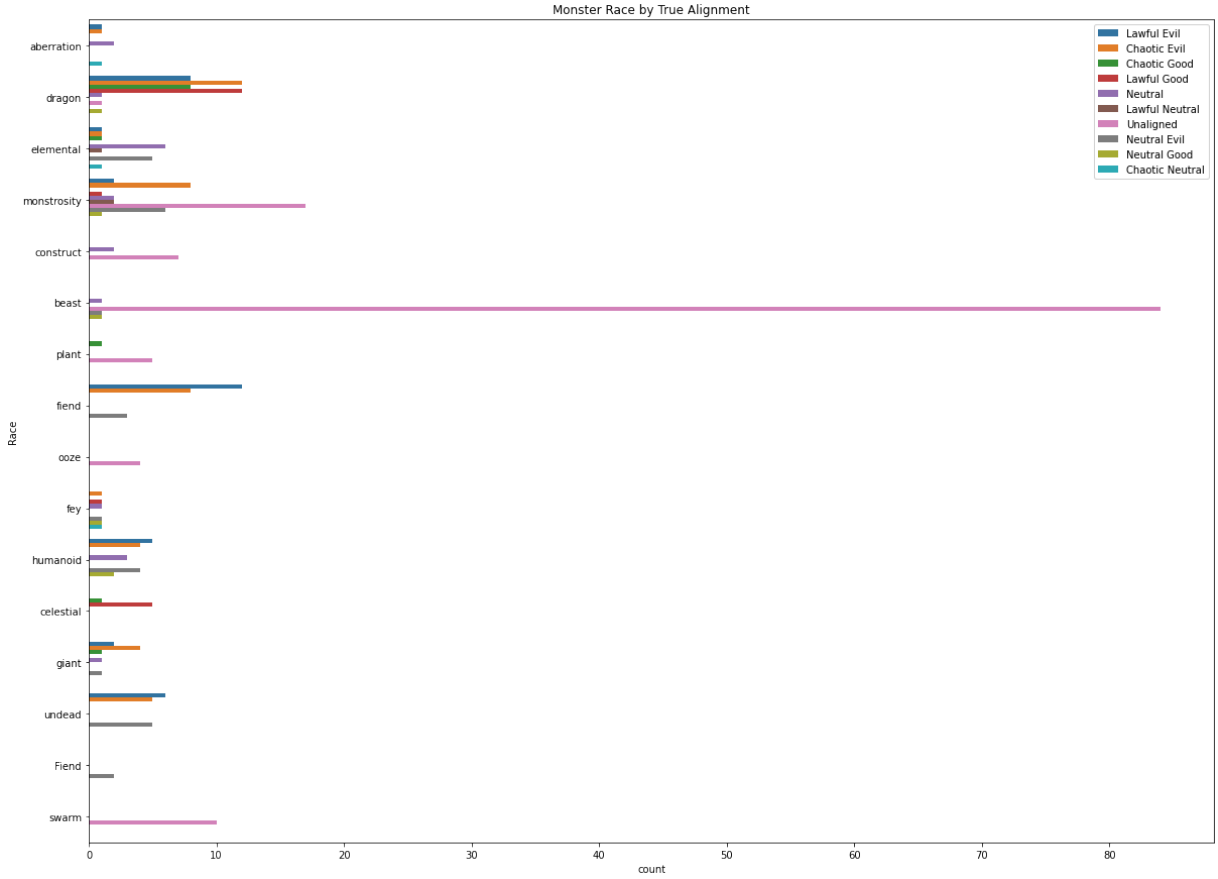
Out[15]:

	Name	Size	HP	Armor	Speed	Race	Alignment	True Alignment
0	Aboleth	Large	135	17	10 ft., swim 40 ft.	aberration	Lawful Evil	1
1	Acolyte	Medium	9	10	30 ft.	humanoid	Any Alignment	0
2	Adult Black Dragon	Huge	195	19	40 ft., fly 80 ft., swim 40 ft.	dragon	Chaotic Evil	1
3	Adult Blue Dragon	Huge	225	19	40 ft., burrow 30 ft., fly 80 ft.	dragon	Lawful Evil	1
4	Adult Brass Dragon	Huge	172	18	40 ft., burrow 40 ft., fly 80 ft.	dragon	Chaotic Good	1

In [16]:
```
dnd['Alignment'].unique()
```

Out[16]:
```
array(['Lawful Evil', 'Any Alignment', 'Chaotic Evil', 'Chaotic Good',
       'Lawful Good', 'Neutral', 'Lawful Neutral', 'Unaligned',
       'Any Non-good Alignment', 'Any Non-lawful Alignment',
       'Neutral Evil', 'Any Chaotic Alignment', 'Neutral Good',
       'Chaotic Neutral', 'Neutral Good (50%) Or Neutral Evil (50%)',
       'Any', 'Any Evil Alignment'], dtype=object)
```

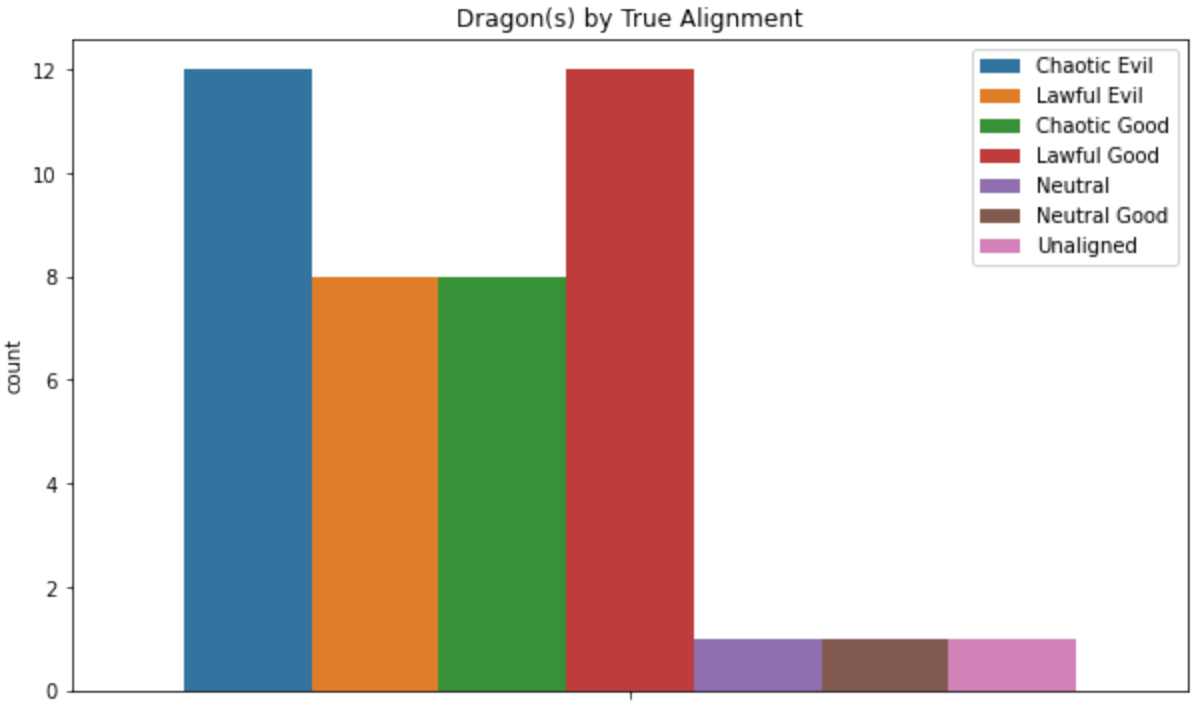
In [39]:
```
# We are using a horizontal bargraph just for visualization because of how this mat

true_alignments = dnd[dnd['True Alignment'] == 1]

fig, ax = plt.subplots(figsize=(20,15))
sns.countplot(y=true_alignments['Race'], hue=true_alignments['Alignment'])
plt.title('Monster Race by True Alignment')
legend = plt.legend()
# plt.savefig('graphs/monster_Race_by_alignment.jpg', bbox_inches = 'tight', edgeco
plt.show()
```



Beasts look to fall mostly in the unaligned category which seems to make sense. We can take a closer look at some of the other races with more variety.

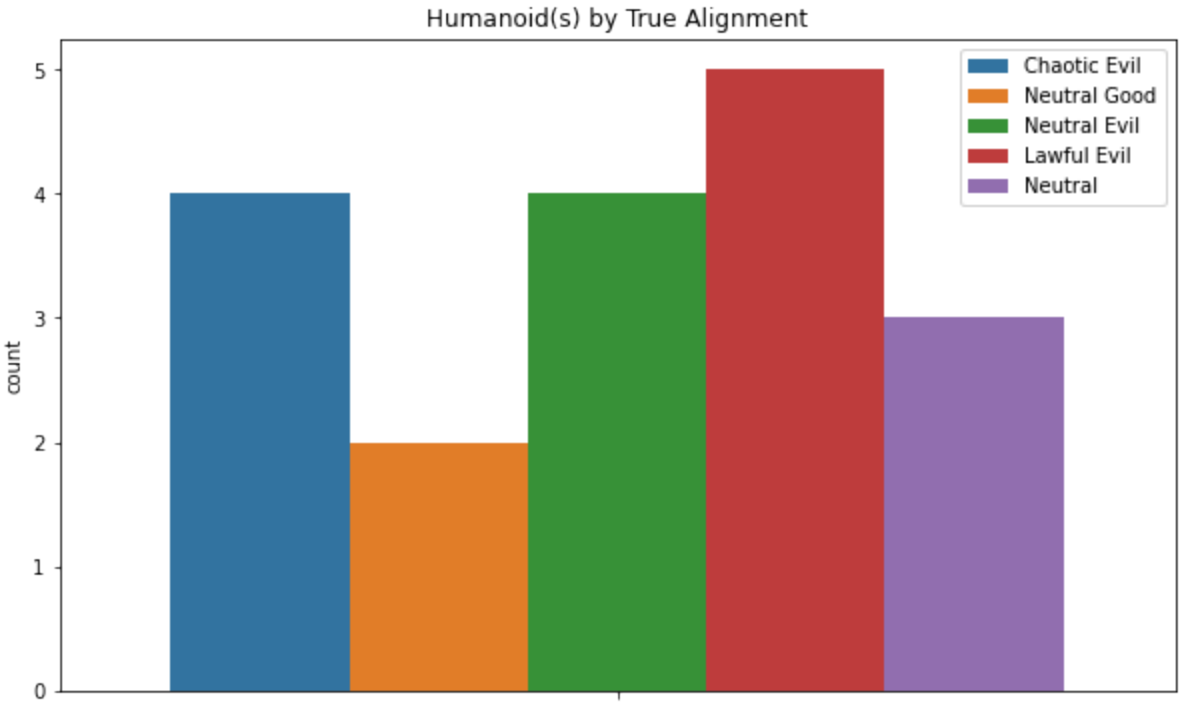
What does the spread of alignment look like for an individual monster race?

In [40]:
```
# create a function for looking at alignment in individual races
def check_alignment(race):
    race = race.lower()
    single_race = true_alignments[true_alignments['Race']==race]

    fig, ax = plt.subplots(figsize=(10,6))
    sns.countplot(x=single_race['Race'], hue=single_race['Alignment'])
    plt.title(f'{race.capitalize()}(s) by True Alignment')
    legend = plt.legend()
    plt.xticks(visible=False)
    plt.xlabel("")
    # plt.savefig(f'graphs/{race}_alignment.jpg', bbox_inches = 'tight', edgecolor=
    plt.show()

check_alignment('dragon')
```



Dragons seem to have a variety, but also a dichotomy between good and evil.

In [41]:
```
check_alignment('humanoid')
```

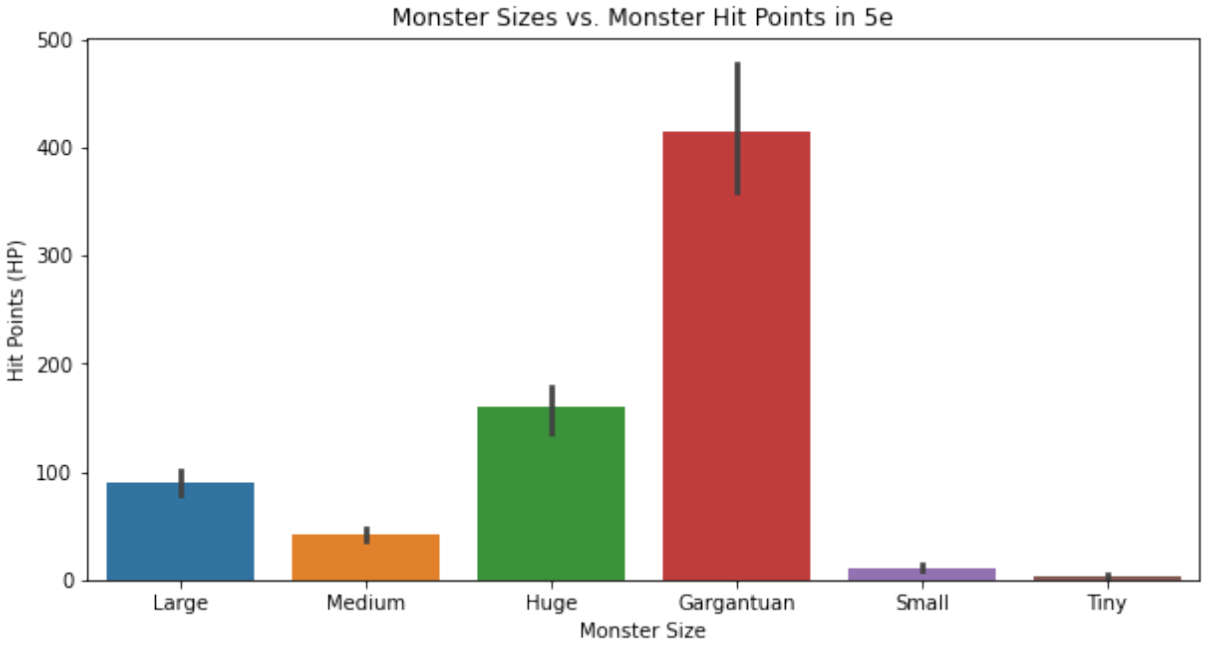


It seems like humanoids are mostly neutral or evil, which makes sense since most player characters are going to be the opposite.

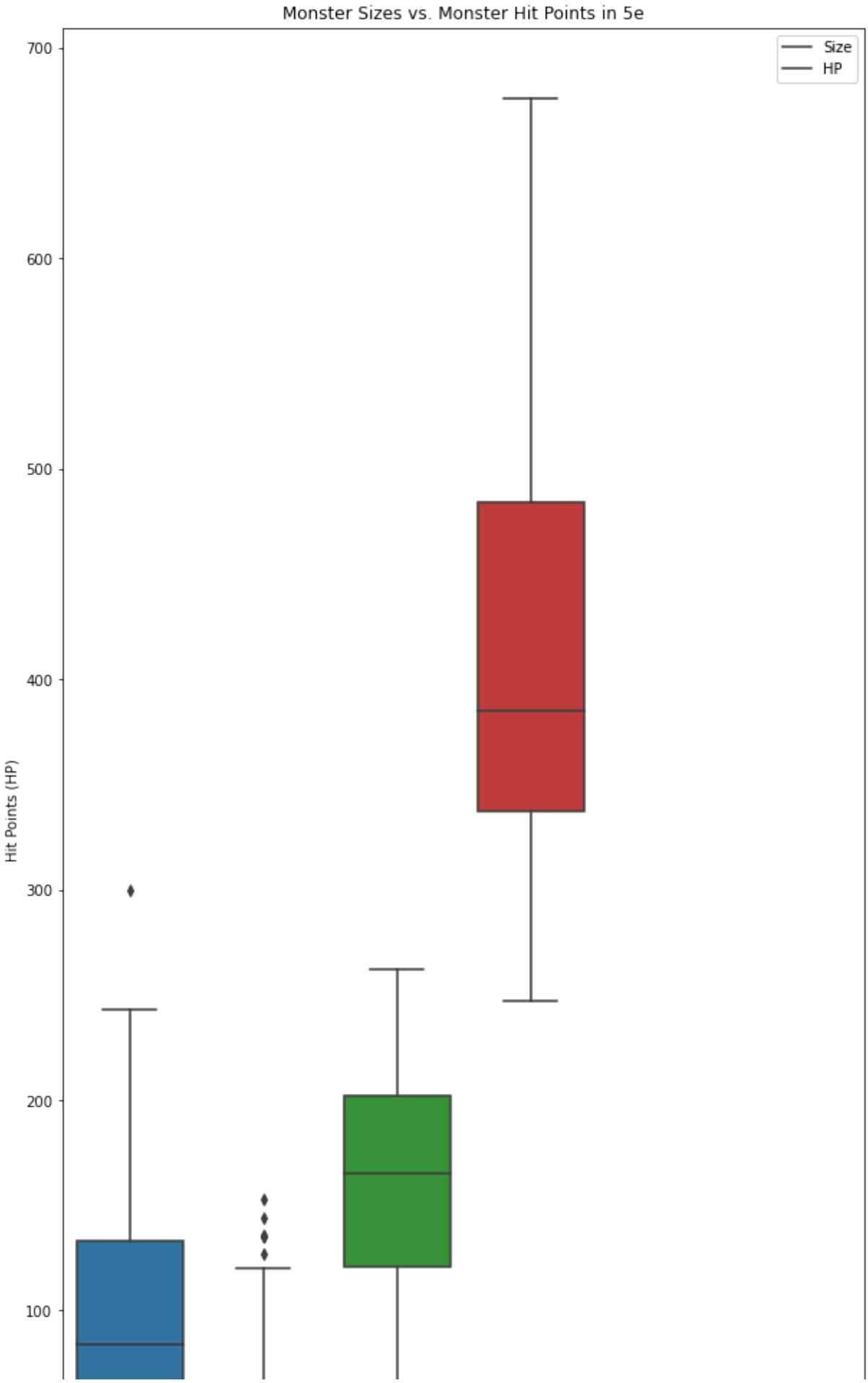
Does monster size impact hit point amounts?

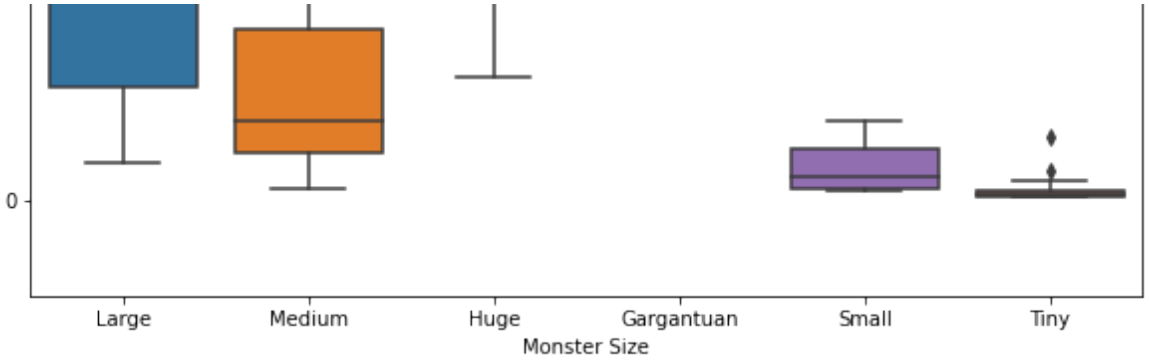
In [20]:
```
monster_size_and_hp = dnd[['Size', 'HP']]
monster_size = monster_size_and_hp['Size']
monster_hp = monster_size_and_hp['HP']
```

In [42]:
```
fig, ax = plt.subplots(figsize=(10,5))
sns.barplot(y=monster_hp, x=monster_size, data=monster_size_and_hp)
plt.title('Monster Sizes vs. Monster Hit Points in 5e')
plt.ylabel('Hit Points (HP)')
plt.xlabel('Monster Size')
# plt.savefig('graphs/monster_size_v_monster_hp.jpg', bbox_inches = 'tight', edgeco
plt.show()
```



In [47]:
```
fig, ax = plt.subplots(figsize=(10,20))
sns.boxplot(y=monster_hp, x=monster_size, data=monster_size_and_hp)
plt.title('Monster Sizes vs. Monster Hit Points in 5e')
plt.ylabel('Hit Points (HP)')
plt.xlabel('Monster Size')
# plt.savefig('graphs/monster_size_v_monster_hp_box.jpg', bbox_inches = 'tight', ed
plt.show()
```


Monster Sizes vs. Monster Hit Points in 5e
Size
HP
Hit Points (HP)
700
600
500
400
300
200
100



In [23]:
```
# finding the largest HP unit in a given monster size category
def find_monster_in_size_with_max_hp(size):
    df = dnd[monster_size==size.capitalize()]
    return df.loc[df['HP'] == df['HP'].max()]['Name'].values[0]
    # dnd[dnd['HP'] == dnd['HP'].max()]['Name'].values[0]

find_monster_in_size_with_max_hp('Gargantuan')
```

Out[23]: 'Tarrasque'

Based off the chart above, the average HP for a monster is definitely associated with its size.

Does a monster's armor class have a correlation with its hit points?

In [24]:
```
#Let's associate the string values of size to numbers so they are ordered in the sc
MONSTER_SIZE_VALUE = {'Tiny': 1,
                      'Small': 2,
                      'Medium': 4,
                      'Large': 8,
                      'Huge': 16,
                      'Gargantuan': 32}

dnd['Size Value'] = dnd['Size'].map(MONSTER_SIZE_VALUE)
```

In [25]:
```
dnd.head()
```

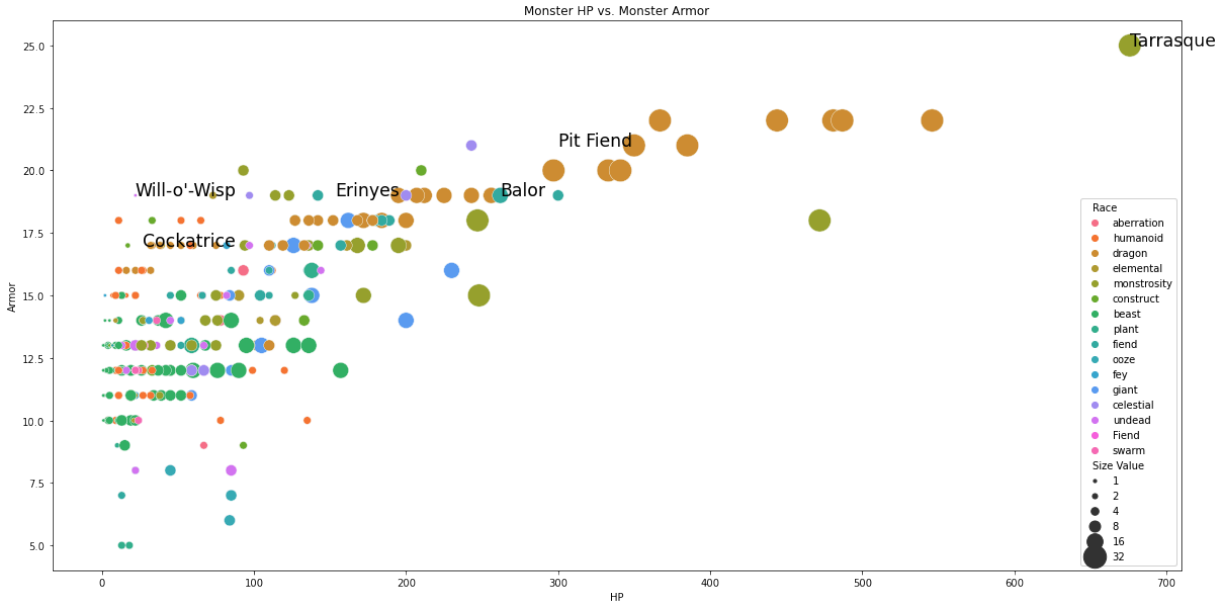
Out[25]:

	Name	Size	HP	Armor	Speed	Race	Alignment	True Alignment	Size Value
0	Aboleth	Large	135	17	10 ft., swim 40 ft.	aberration	Lawful Evil	1	8
1	Acolyte	Medium	9	10	30 ft.	humanoid	Any Alignment	0	4
2	Adult Black Dragon	Huge	195	19	40 ft., fly 80 ft., swim 40 ft.	dragon	Chaotic Evil	1	16
3	Adult Blue Dragon	Huge	225	19	40 ft., burrow 30 ft., fly 80 ft.	dragon	Lawful Evil	1	16
4	Adult Brass Dragon	Huge	172	18	40 ft., burrow 40 ft., fly 80 ft.	dragon	Chaotic Good	1	16

In [26]:
```
list(dnd['Size'].unique())
```

Out[26]:
```
['Large', 'Medium', 'Huge', 'Gargantuan', 'Small', 'Tiny']
```

In [44]:
```
monster_hp = dnd['HP']
monster_armor = dnd['Armor']

MONSTER_SYMBOLS = []



fig,ax = plt.subplots(figsize=(20,10))

sns.scatterplot(x=monster_hp, y=monster_armor, hue=dnd['Race'], size=dnd['Size Valu
plt.text(monster_hp[dnd['Size']=='Tiny'].max(),monster_armor[dnd['Size']=='Tiny'].m
plt.text(monster_hp[dnd['Size']=='Small'].max(),monster_armor[dnd['Size']=='Small']
plt.text(monster_hp[dnd['Size']=='Medium'].max(),monster_armor[dnd['Size']=='Medium
plt.text(monster_hp[dnd['Size']=='Large'].max(),monster_armor[dnd['Size']=='Large']
plt.text(monster_hp[dnd['Size']=='Huge'].max(),monster_armor[dnd['Size']=='Huge'].m
plt.text(monster_hp[dnd['Size']=='Gargantuan'].max(),monster_armor[dnd['Size']=='Ga

ax.set_title('Monster HP vs. Monster Armor')
# plt.savefig('graphs/monster_hp_v_monster_armor.jpg', bbox_inches = 'tight', edgec
```



What is that dot in the top right???

In [28]:
```
dnd[dnd['HP'] == dnd['HP'].max()]['Name'].values[0]
```

Out[28]:
```
'Tarrasque'
```

The Tarrasque has the highest HPs and Armor class, making it a very powerful and strong opponent.

Suggestions to the Dungeons and Dragons creators

1. Based off findings, Beasts make up a huge portion of the monster races. I believe it would be best to create more official monsters from other races. The reason being that it promotes more campaign settings, especially for early levels.

2. Another area of focus would be the bring in more "good" alignments for monster races. The data shows that Humanoids are mostly evil and neutral. Some more guidance for players who come up across lawful good NPCs would be interesting.

3. Last suggestion would be to add a few more variations for HP vs. Monster Size. Right now it's pretty proportional, as size goes up, HP goes up. It would be great to see some Tiny creatures with 20-50 HP just to give players a hard time. Something that is super hard to lock down, but maybe not super powerful.