Final individual capstone project
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Question 1:

Decision 1: Which game should Athena pursue, if any?
Action standards:
- Market segmentation: If there's existing and potential demands from certain segmentations that are interested in any of the game concepts
- Return on investment(ROI)
- Payback period: since the majority of game sales occur within the first year of the release, the period should not exceed one year.
- Profit forecast

Action alternatives:
- Do not launch any of these games
- Look for other potential new games

Decision 2: How should the game be priced?
Action standards:
- Target consumer's WTP
- Gabor-Granger & PSM pricing methods evaluation

Action alternatives:
- Free download and offer in-game purchase

Question 2:

2.a.
The general market size is approximately 5.2 billion dollars according to the SuperData report. Since Athena focuses on selling premium RPG for PC plays, I took the 2019 revenue of this category. However, since Athena exclusively sells via Steam, the more precise market size could be 5.2 * 37% (mentioned in the report as percentage of PC downloads via Steam) = **1.9 billion dollars.**

2.b.
According to the report forecast, 2020 premium PCs would be 5.3 billion dollars. However, since it's mentioned in the report that other gaming platforms will launch/ are capturing more users, I make the estimation of PC downloads via Steam will decrease to 33%. Hence, my market size projection is **5.3 * 33% = 1.75 billion dollars**.

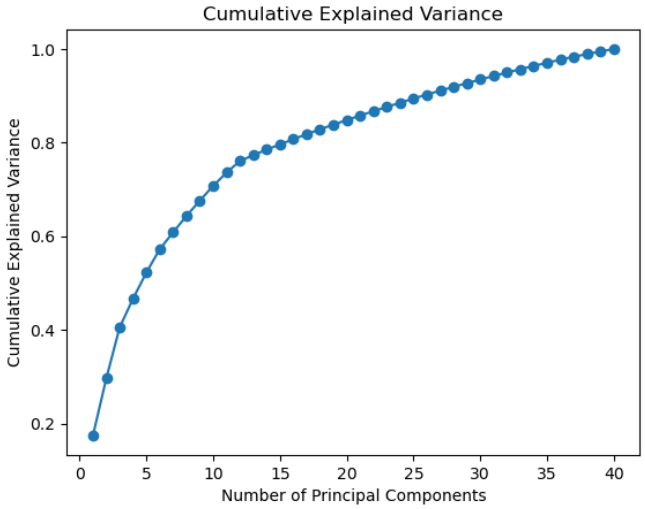
2.c.

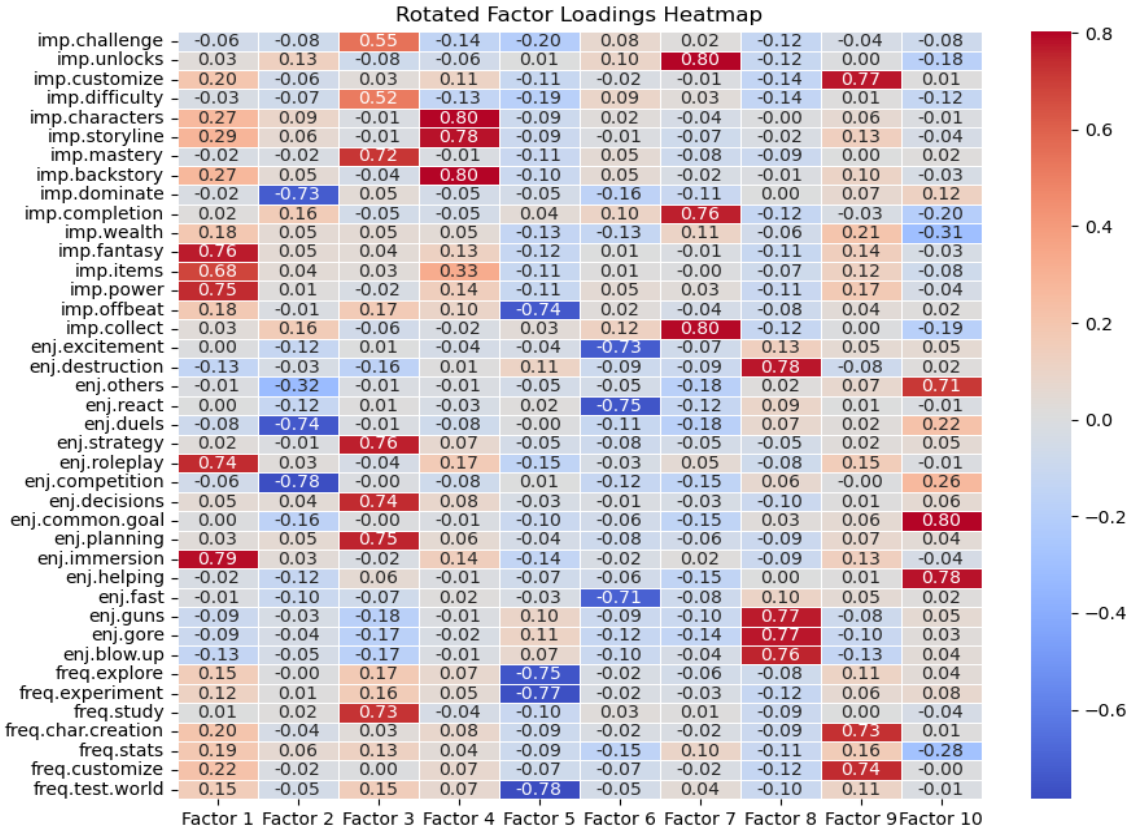
I think Covid-19 could stimulate this market in these aspects:

- PC gaming could be a great way of entertainment during lockdowns.
- Remote working mode could blur the boundary between working and entertaining at home, so people might spend more time/make more investments in PC gaming.

Question 3:

3.a.





Factor 1: Fantasy immersion
Importance: Pretending that I am someone / somewhere else Importance: Acquiring powerful weapons and artifacts
Importance: Becoming as powerful as possible
Enjoyment: Being immersed in another world / place

Factor 2: Competition-avoidance
Importance: Dominating other players (negative)
Enjoyment: Going up against other players in duels or matches (negative)
Enjoyment: Competing with other players (negative)

Factor 3: Strategic-minded
Importance: Taking on difficult challenges that may take many tries to succeed
Importance: Playing the game at the highest difficulty level
Importance: Taking the time to practice and master a game
Enjoyment: Gameplay that requires long-term planning and strategy
Enjoyment: Gameplay that requires careful decision-making
Enjoyment: Gameplay that requires a lot of thinking and planning
Frequency: Study other players to improve my own gameplay

Factor 4: Story-centric
Importance: Characters with interesting back-stories and personalities
Importance: An elaborate storyline
Importance: Getting to know all the main characters and their backstories

Factor 5: Convention-following discovery
Importance: Discovering offbeat or unconventional ways to play the game (negative)
Frequency: Explore the game world just for the sake of exploring it (negative)
Frequency: Experimenting with objects in the world just to see what happens (negative)
Frequency: Try out many different things to test what the game world lets me do (negative)

Factor 6: Challenge-seeking
Enjoyment: Gameplay with constant action and excitement (negative)
Enjoyment: Gameplay that requires quick reaction times (negative)
Enjoyment: Gameplay that is fast-paced and intense (negative)

Factor 7: Completion collection
Importance: Getting every possible star / trophy / unlock in a game
Importance: Completing all possible missions and achievements in a game
Importance: Making an effort to get every collectible item in the game

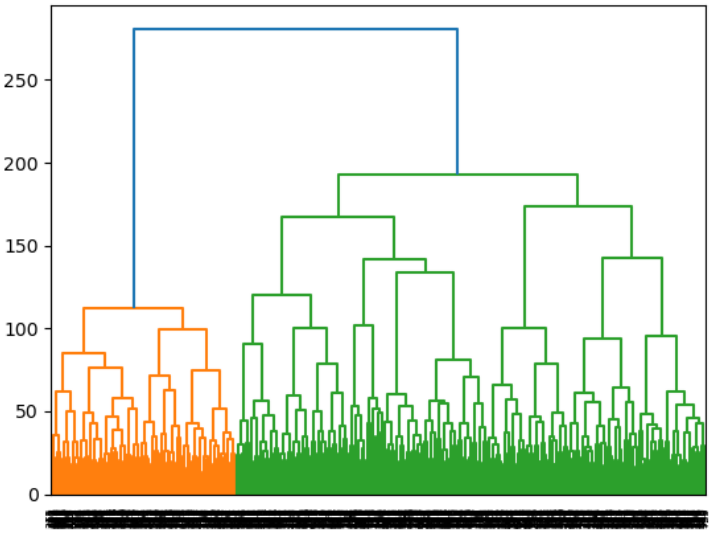
Factor 8: Destruction
Enjoyment: Being an agent of chaos and destruction
Enjoyment: Using guns and explosives

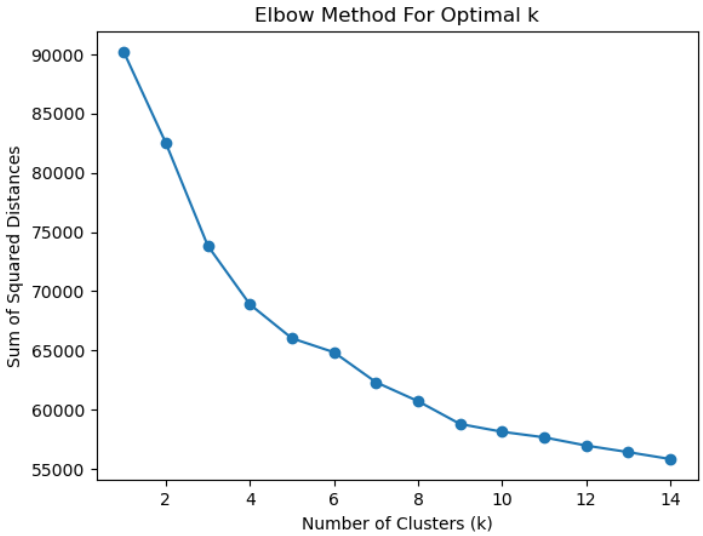
Enjoyment: Gameplay with lots of blood and gore
Enjoyment: Blowing things up

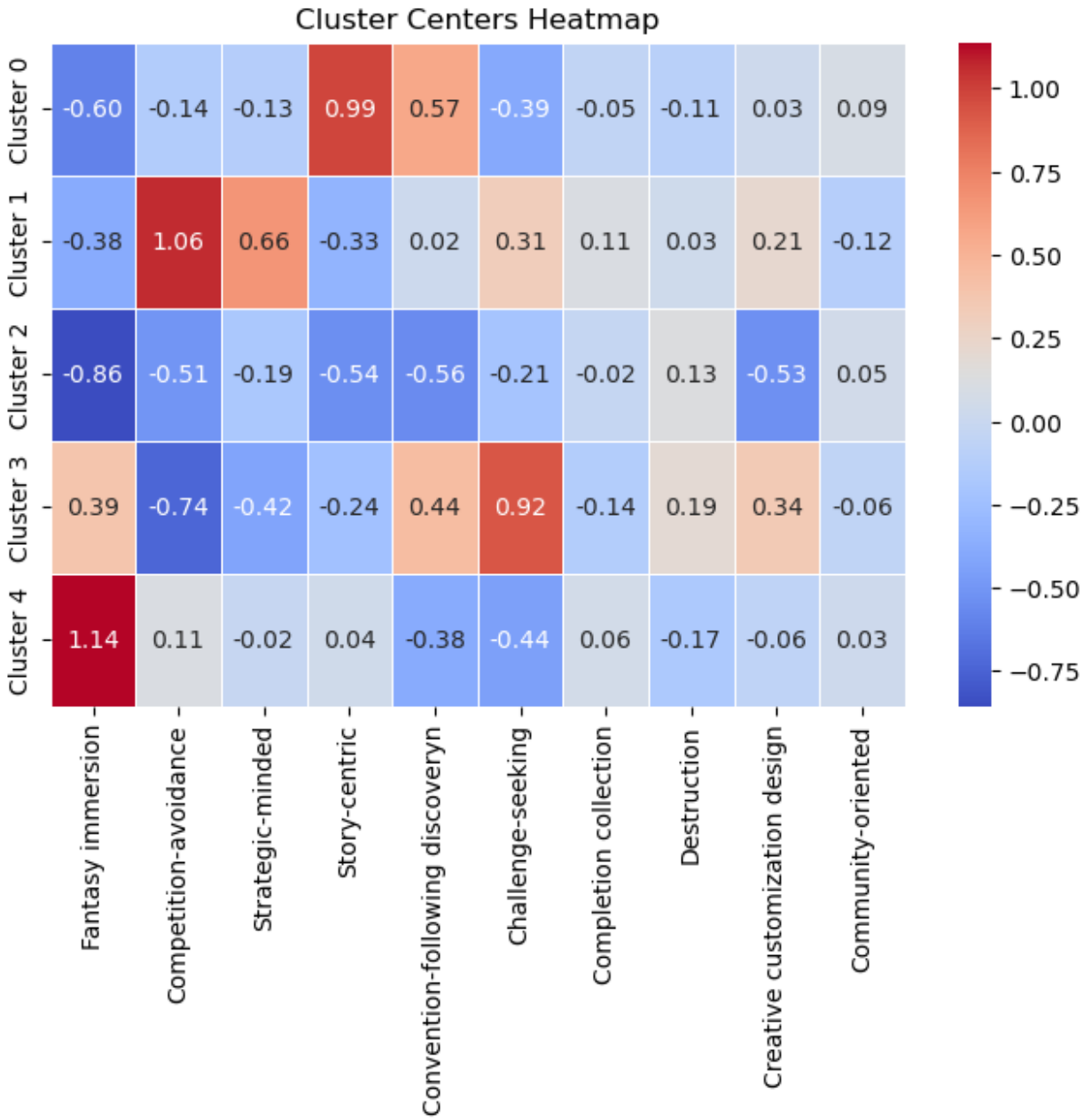
Factor 9: Creative customization design
Importance: Having many customization colors, styles, skins, and options
Frequency: Put a lot of thought and effort into the character creation process
Frequency: Put considerable time into customizing my characters / cities / spaceships

Factor 10: Community-oriented
Enjoyment: Grouping up with other players
Enjoyment: Working towards a common goal with other players
Enjoyment: Helping other players

3.b.







Cluster 0: Novel reader
Interested in game plot setting and discovery process like reading a good novel, disinterest of immersive fantasy and challenges

Cluster 1: Architect(referred from report '9 player segments')
Prefer overcome challenges with long-term strategy alone, high tendency to avoid competition and likely to collect completion trophy

Cluster 2: Time filler (referred from report 'Newzoo_Gamer_segmentation')
High tendency to avoid immersive experience, show limited care about storyline and customization flexibility. Prefer competition and novel discovery.

Cluster 3: Skirmisher (referred from report '9 player segments')
Favor competition against other players and fast-paced difficult challenges. Prefer immersive experience and creative customization.

Cluster 4: Connoisseurs
Pay attention to immersive fantasy experiences, and want to be whole-heartedly involved in the game. Enjoy novel discovery in the game but dislike competition

3.c.

Regression analysis with age and income:
Across two regression analyses, cluster 'Novel reader' is statistically insignificant with age and income, while other clusters are all significant.

Dep. Variable:	age	**R-squared:**	0.109
Model:	OLS	**Adj. R-squared:**	0.104
Method:	Least Squares	**F-statistic:**	25.04
Date:	Tue, 12 Dec 2023	**Prob (F-statistic):**	1.36e-19
Time:	18:32:18	**Log-Likelihood:**	-3000.1
No. Observations:	827	**AIC:**	6010.
Df Residuals:	822	**BIC:**	6034.
Df Model:	4		
Covariance Type:	nonrobust		

	coef	std err	t	P>|t|	[0.025	0.975]
const	29.4269	0.698	42.139	0.000	28.056	30.798
Connoisseurs	1.9506	0.947	2.060	0.040	0.092	3.809
Novel reader	-1.7950	1.000	-1.796	0.073	-3.757	0.167
Skirmisher	-5.3019	1.033	-5.133	0.000	-7.329	-3.275
Time Filler	-6.4821	1.031	-6.288	0.000	-8.506	-4.459

Dep. Variable:	income	**R-squared:**	0.071
Model:	OLS	**Adj. R-squared:**	0.067
Method:	Least Squares	**F-statistic:**	15.78
Date:	Tue, 12 Dec 2023	**Prob (F-statistic):**	1.90e-12
Time:	17:34:03	**Log-Likelihood:**	-9765.1
No. Observations:	827	**AIC:**	1.954e+04
Df Residuals:	822	**BIC:**	1.956e+04
Df Model:	4		
Covariance Type:	nonrobust		

	coef	std err	t	P>|t|	[0.025	0.975]
const	5.558e+04	2492.776	22.298	0.000	5.07e+04	6.05e+04
Connoisseurs	7738.7341	3379.744	2.290	0.022	1104.790	1.44e+04
Novel reader	-2590.9303	3568.311	-0.726	0.468	-9595.003	4413.143
Skirmisher	-1.254e+04	3686.865	-3.400	0.001	-1.98e+04	-5299.406
Time Filler	-1.724e+04	3679.957	-4.685	0.000	-2.45e+04	-1e+04

Cross-tabulation with gender and state:
After examination of variable 'state', 49 distinctive states are discovered. To facilitate and simplify further analysis, I classified different states into four region categories: Midwest, West, South and Northwest.
The results show that both p-values are larger than 0.05, so variables gender and location remain insignificant regarding cluster categorization.

```
xtab(survey['Segment_Label'], survey['gender'])
```

```
Chi-squared value: 10.699928924112292
P-value: 0.21928806524404204
```

Segment_Label	gender	female	male	nonbinary
Architect	Observed	73	94	4
	Expected	77.95	90.36	2.69
	Chi squared	0.31	0.15	0.64
Connoisseurs	Observed	104	97	3
	Expected	93.0	107.8	3.21
	Chi squared	1.3	1.08	0.01
Novel reader	Observed	67	93	3
	Expected	74.31	86.13	2.56
	Chi squared	0.72	0.55	0.07
Skirmisher	Observed	76	67	1
	Expected	65.64	76.09	2.26
	Chi squared	1.63	1.09	0.71
Time Filler	Observed	57	86	2
	Expected	66.1	76.62	2.28
	Chi squared	1.25	1.15	0.03

```
xtab(survey['Segment_Label'], survey['Region'])
```

```
Chi-squared value: 13.842805880023302
P-value: 0.31085891068267657
```

Segment_Label	Region	Midwest	Northeast	South	West
Architect	Observed	33	39	61	38
	Expected	32.05	35.15	61.41	42.39
	Chi squared	0.03	0.42	0.0	0.45
Connoisseurs	Observed	45	40	61	58
	Expected	38.23	41.93	73.26	50.57
	Chi squared	1.2	0.09	2.05	1.09
Novel reader	Observed	28	34	66	35
	Expected	30.55	33.51	58.54	40.41
	Chi squared	0.21	0.01	0.95	0.72
Skirmisher	Observed	27	35	47	35
	Expected	26.99	29.6	51.71	35.7
	Chi squared	0.0	0.98	0.43	0.01
Time Filler	Observed	22	22	62	39
	Expected	27.18	29.81	52.07	35.94
	Chi squared	0.99	2.04	1.89	0.26

Cluster stats summary:

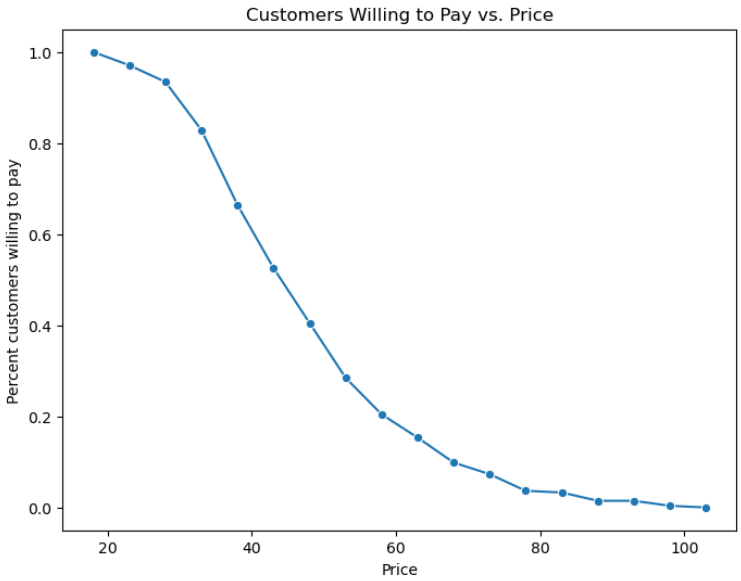
	Segment_Label	age	income	Female_Percentage
0	Architect	29.43	55584.80	42.69
1	Connoisseurs	31.38	63323.53	50.98
2	Novel reader	27.63	52993.87	41.10
3	Skirmisher	24.12	43048.61	52.78
4	Time Filler	22.94	38344.83	39.31

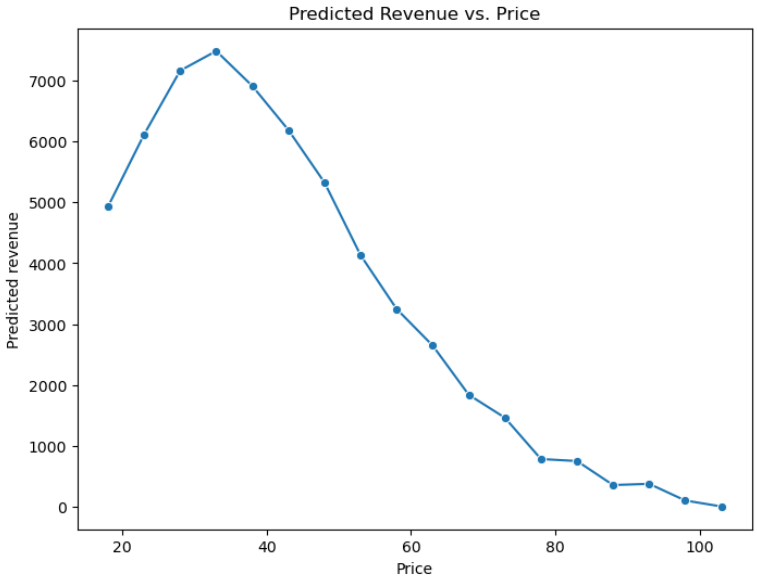
Among all clusters, Connoisseurs have the highest average age and highest income while Time fillers are the youngest with the least income on average. Skirmisher has the highest percentage of female players, while Time filler has the lowest.

Question 4.

4.a.

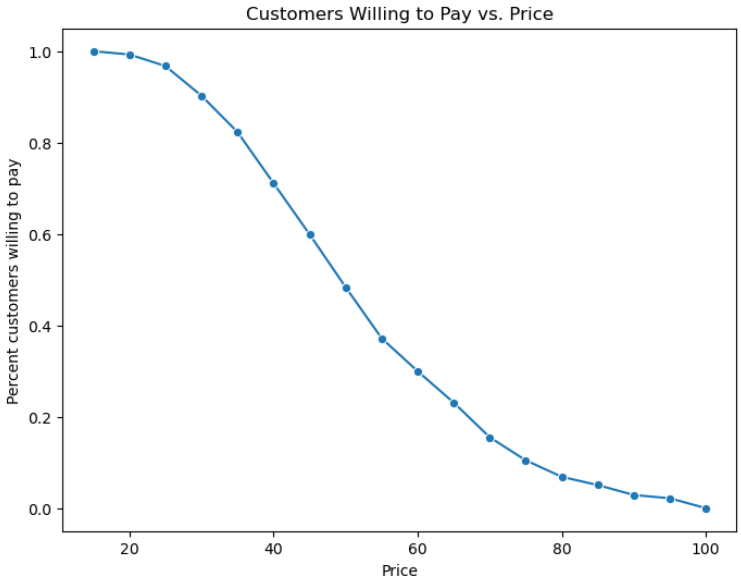
Warrior Guild:

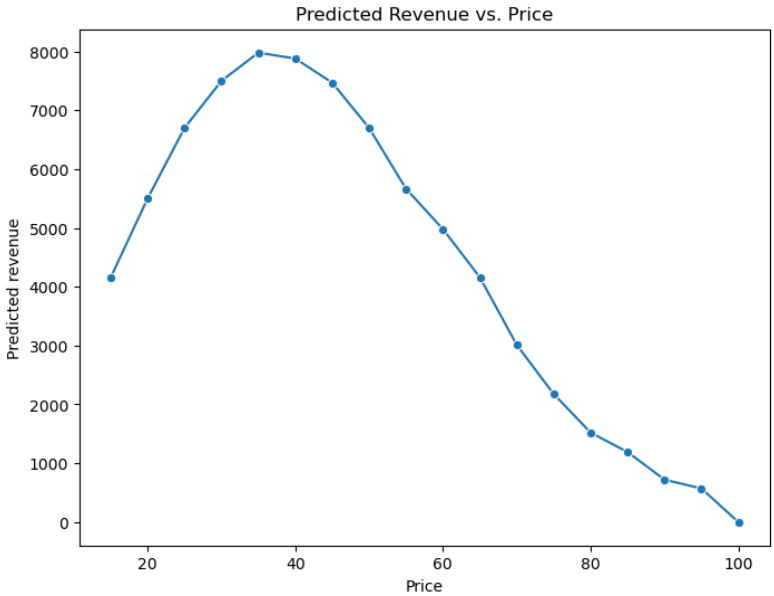





```
The optimal price for maximum predicted revenue is: 33
Percent customers willing to pay at price $33: 0.828
```

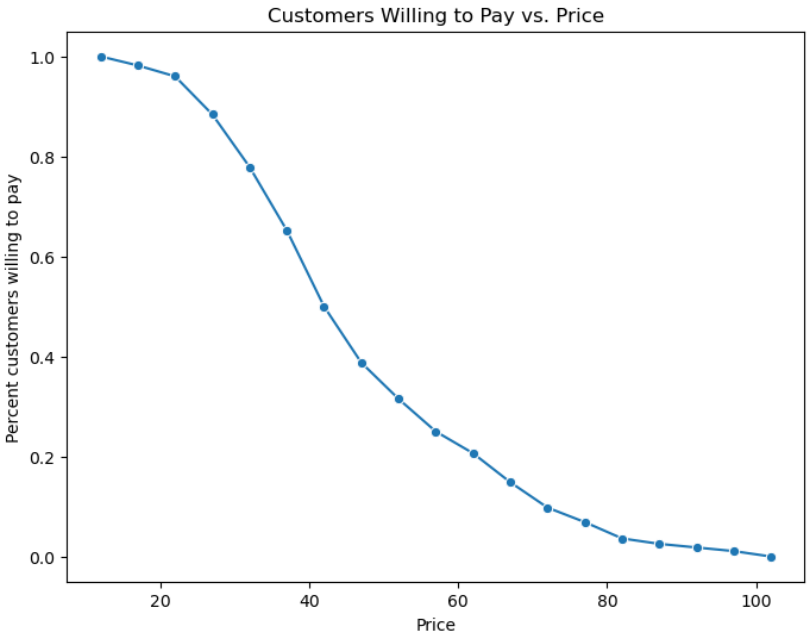
Seraph Guardians:

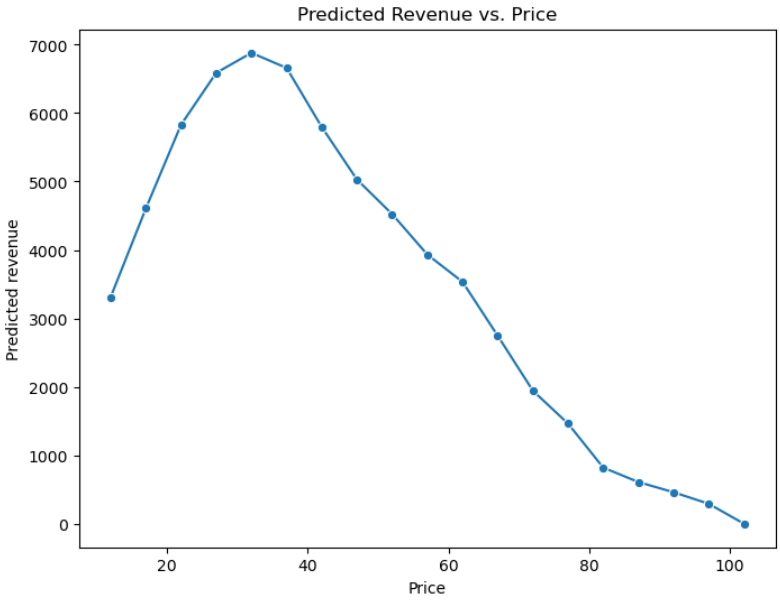





```
The optimal price for maximum predicted revenue is: 35
Percent customers willing to pay at price $35: 0.823
```

Evercrest:






```
The optimal price for maximum predicted revenue is: 32
Percent customers willing to pay at price $32: 0.779
```

4.b.

Warrior Guild:

	coef	std err	t	P>|t|	[0.025	0.975]
const	43.7358	2.084	20.983	0.000	39.632	47.839
Connoisseurs	6.8121	2.738	2.488	0.013	1.421	12.203
Novel reader	5.8242	2.992	1.947	0.053	-0.066	11.714
Skirmisher	-0.5692	3.023	-0.188	0.851	-6.522	5.383
Time Filler	-1.9958	2.992	-0.667	0.505	-7.886	3.894

Among statistically -significant segments, Connoisseur is the most-interested segment; Architect is the least-interested segment.

Seraph Guardians:

	coef	std err	t	P>|t|	[0.025	0.975]
const	49.4464	2.133	23.181	0.000	45.247	53.646
Connoisseurs	13.8914	2.827	4.913	0.000	8.325	19.458
Novel reader	-3.7464	2.966	-1.263	0.208	-9.586	2.093
Skirmisher	-2.6339	3.140	-0.839	0.402	-8.815	3.548
Time Filler	-6.2926	3.329	-1.890	0.060	-12.847	0.262

Among statistically -significant segments, Connoisseur is the most-interested segment; Architect is the least-interested segment.

Evercrest:

	coef	std err	t	P>|t|	[0.025	0.975]
const	45.2742	2.194	20.638	0.000	40.955	49.593
Connoisseurs	8.6030	3.170	2.714	0.007	2.362	14.844
Novel reader	0.0277	3.231	0.009	0.993	-6.334	6.390
Skirmisher	0.6216	3.321	0.187	0.852	-5.917	7.160
Time Filler	-7.5956	3.184	-2.385	0.018	-13.865	-1.326

Among statistically -significant segments, Connoisseur is the most-interested segment; Time FIller is the least-interested segment.

4.c.

Assume the launch price of each game will be the optimal price identified in question 4.a. The calculation logic follows:

1. gross revenue = price * WTP * user_number (10m) * conversion_rate (0.3)
2. net revenue = gross revenue - royalty - fixed cost - game development cost - Steam commission on game sales

Warrior Guild:

```
# for warrior guild
price = 33
WTP = 0.828
Gross_revenue = price * WTP * user_number * conversion_rate
royalty_fee = Gross_revenue * royalty_rate

def steam_commission(gross_revenue):
    if gross_revenue <= 10000000:
        return 0.3 * gross_revenue
    elif 10000000 < gross_revenue <= 50000000:
        return 0.3 * 10000000 + 0.25 * (gross_revenue - 10000000)
    elif gross_revenue > 50000000:
        return 0.3 * 10000000 + 0.25 * 40000000 + 0.2 * (gross_revenue - 50000000)

Net_revenue = Gross_revenue - steam_commission(Gross_revenue) - royalty_fee - Fixed_cost - cost_w

print(f'The Gross revenue for Warrior Guild is {Gross_revenue}')
print(f'The Gross revenue for Warrior Guild is {Net_revenue}')
```

```
The Gross revenue for Warrior Guild is 81972000.0
The Gross revenue for Warrior Guild is 46479000.0
```

Seraph Guardians:

```
# for Seraph Guardians
price = 35
WTP = 0.823
Gross_revenue = price * WTP * user_number * conversion_rate
royalty_fee = Gross_revenue * royalty_rate

def steam_commission(gross_revenue):
    if gross_revenue <= 10000000:
        return 0.3 * gross_revenue
    elif 10000000 < gross_revenue <= 50000000:
        return 0.3 * 10000000 + 0.25 * (gross_revenue - 10000000)
    elif gross_revenue > 50000000:
        return 0.3 * 10000000 + 0.25 * 40000000 + 0.2 * (gross_revenue - 50000000)

Net_revenue = Gross_revenue - steam_commission(Gross_revenue) - royalty_fee - Fixed_cost - cost_w

print(f'The Gross revenue for Seraph Guardians is {Gross_revenue}')
print(f'The Gross revenue for Seraph Guardians is {Net_revenue}')
```

```
The Gross revenue for Seraph Guardians is 86415000.0
The Gross revenue for Seraph Guardians is 49811250.0
```

Evercrest:

```
# for Evercrest
price = 32
WTP = 0.779
Gross_revenue = price * WTP * user_number * conversion_rate
royalty_fee = Gross_revenue * royalty_rate

def steam_commission(gross_revenue):
    if gross_revenue <= 10000000:
        return 0.3 * gross_revenue
    elif 10000000 < gross_revenue <= 50000000:
        return 0.3 * 10000000 + 0.25 * (gross_revenue - 10000000)
    elif gross_revenue > 50000000:
        return 0.3 * 10000000 + 0.25 * 40000000 + 0.2 * (gross_revenue - 50000000)

Net_revenue = Gross_revenue - steam_commission(Gross_revenue) - royalty_fee - Fixed_cost - cost_w

print(f'The Gross revenue for Evercrest is {Gross_revenue}')
print(f'The Gross revenue for Evercrest is {Net_revenue}')
```

```
The Gross revenue for Evercrest is 74784000.0
The Gross revenue for Evercrest is 41088000.0
```

Question 5:

5.a.

```
for alternative in action_alternatives:
    print(alternative)
    market_share_values = market_share(ranking_data.iloc[:, alternative])
    rounded_market_share = np.round(market_share_values, 3)
    print(rounded_market_share)
    print('---')
```

```
[0, 3, 4, 5]
[0.237 0.258 0.096 0.41 ]
---
[1, 3, 4, 5]
[0.618 0.278 0.019 0.085]
---
[2, 3, 4, 5]
[0.195 0.346 0.106 0.353]
---
```

Index 3,4 & 5 represent three competitor games that will be launched. The action alternatives simulate three possible situations:

1. Warrior Guild will be launched, with a market share of **0.237**
2. Seraph Guardians will be launched, with a market share of **0.618**
3. Evercrest will be launched, with a market share of **0.195**

5.b.

One of the assumptions I want to change is equal pricing, which is highly unrealistic in the real market. For our candidate games, the launching price will be set as the optimal price we have in question 4. Prices of competitor games could be decided based on thorough competitor analysis (their company positioning etc, since Athena focuses on the premium market).

Question 6:

After thorough analysis, I would recommend launching Seraph Guardians, particularly targeting the segment 'Connoisseurs'.

- From the game itself, statistically-speaking it brings the **highest gross and net revenues** forecast within the first year compared to other two games, which are 86415000$ and 49811250$ respectively. Moreover, in the market share simulation, Seraph Guardians has **the highest market share of 0.618** along with other three competitor games, which is almost three times higher than other candidate games. Also, Seraph Guardians has **the highest optimal price ($35)** compared to other two games.
- According to the segmentation, Connoisseurs enjoy an immersive fantastic experience, great background story and exceptional discovery process on their own. Seraph Guardians, as a single player RPG blended with mythology elements allowing players to

accomplish every goal in their own way, **captures Connoisseurs' appetite successfully**.

- Echoing with the previous point, Connoisseurs is also **the most-interested cluster for Seraph Guardians**, with a willingness to pay(WTP) of 63.3378 while other clusters' WTP are around 50. From the demographic perspective, Connoisseurs **have the highest income among all other clusters**, which set the cornerstone for their significant purchasing power and willingness.
- Lastly on the corporate strategy level, Athena has specialized in the premium PC RPG market. Seraph Guardians with its premium price and quality could c**onsolidate current Athena's offering portfolios and strengthen brand image as a premium game publisher**.