

1. [5pt] There are three key decisions to make in conjunction:

a. Which game should Athena pursue, if any?

Answer: Athena should pursue Solitary Navigators.

b. How should the game be priced? 35

Answer: The game should be priced at \$35.

c. How should Athena position this game?

Answer: Based on a thorough analysis of market data, customer preferences, financial projections, and the competitive landscape, Athena could consider a universal appeal approach, a tiered pricing strategy to cater to different segments. Positioning the game diversifies its portfolio. For example, a deluxe version and a standard version

2. [5pt] Using any of the resources from the class or the resources included with this assignment (but no external sources), determine the following.

a. What is the market size for the types of games Athena sells in 2019? How did you determine this number and which resources did you use?

Answer: The market size for the types of games Athena sells in 2019 is \$5.2B based on 2019 YEAR IN REVIEW(page 13). Based on the background information of Athena Softworks, Inc., we can know that Athena specializes in premium role-playing games (RPGs) for PC play.

b. What do you project the market size to be in 2020, ignoring COVID-19? Why?

Answer: The estimated market size in 2020 will be around \$5.3B. Factors that lead to this result are the growth trajectory of the gaming industry, the increasing popularity of PC gaming, and the release schedule of major premium PC titles.

c. How would you expect COVID-19 to impact this market? (No analysis, just a thoughtful response.) Moving forward, you may ignore any effects of COVID-19 on the market.

Answer: As for the potential impact of COVID-19 on this market, we can assume that the pandemic might have led to an increase in consumer engagement with gaming due to lockdowns and the need for at-home entertainment. Quarantine at home resulted in a

higher anticipated market growth for premium PC games. Besides, the pandemic might also accelerate the shift towards digital distribution, as physical retail and distribution channels are disrupted by the pandemic.

3. [20pt] Your coworkers conducted a survey conducted with a sample of prior customers.

The survey contained a series of 40 statements and participants rated these on a 7-point Likert scale; the survey statements may be found on page 4. As you investigate this data, may use any of the provided resources as a guide on substantive content (e.g., if you are not familiar with the video game industry), but note that the results may not map cleanly to these secondary resources.

- To identify potential segments in the market, first perform factor analysis. Include the factor loadings in your report. Name and interpret the factors. Identify the most relevant survey statements for each factor.

Answer:

Index	Roleplayer	Lone wolf	Strategist	Storyteller	Explorer	Effortless	Daredevil	Achievement Hunter	Calm Commander
imp.challenge	-0.066331711	0.038318532	0.538692349	-0.157580425	-0.204947607	0.027946732	-0.128875409	0.007750831	0.038787775
imp.unlocks	0.027132925	0.263999259	-0.078596429	-0.069299415	0.002710413	-0.006139818	-0.117616744	0.786196726	0.095054019
imp.customize	0.199324186	-0.052764134	0.033062419	0.107964365	-0.108350442	-0.773588929	-0.136899543	-0.00709617	-0.028466903
imp.difficulty	-0.028311625	0.080744095	0.507782715	-0.151116975	-0.189240175	-0.026327245	-0.143390409	0.013991706	0.051835126
imp.characters	0.268414151	0.065294148	-0.013410051	0.801728582	-0.088990546	-0.05827465	-0.001018106	-0.036905756	0.033349629
imp.storyline	0.285177748	0.071051711	-0.017410851	0.779782149	-0.093542333	-0.135357678	-0.018655613	-0.074364585	-0.005153573
imp.mastery	-0.024819631	-0.035135878	0.718604149	-0.011386928	-0.104855813	-0.004233614	-0.092149653	-0.076077995	0.044966469
imp.backstory	0.269624991	0.06896376	-0.046022318	0.794528389	-0.10224507	-0.109155915	-0.006852794	-0.02873934	0.048314108
imp.dominate	-0.027255758	-0.408361914	0.02878909	-0.104886116	-0.052066168	-0.104364982	-0.007631747	-0.136575359	-0.279285363
imp.completion	0.011266121	0.296947591	-0.05642805	-0.051646735	0.036318164	0.021404389	-0.124607007	0.745907224	0.11011375
imp.wealth	0.177542666	0.307798036	0.045788352	0.030468826	-0.133405077	-0.221767627	-0.059848128	0.078956209	-0.147614983
imp.fantasy	0.764251296	0.052589895	0.042053517	0.128464375	-0.121878753	-0.143198023	-0.111626805	-0.009867643	0.009688837
imp.items	0.68169129	0.098088176	0.027944526	0.323777247	-0.115073418	-0.125289349	-0.073522717	-0.004771245	0.010173336
imp.power	0.746448394	0.048811294	-0.024431558	0.136851994	-0.112104095	-0.17349593	-0.108922646	0.025999111	0.046412546
imp.offbeat	0.179708399	-0.030984659	0.168864165	0.100512863	-0.738542458	-0.036138616	-0.083419662	-0.038160104	0.014121804
imp.collect	0.027329494	0.288767026	-0.063698912	-0.028451547	0.031389497	-0.004239762	-0.11933649	0.778150752	0.129002882
enj.excitement	0.007092723	-0.122290258	0.012716431	-0.035259016	-0.033391711	-0.046435208	0.136755096	-0.057516167	-0.716272354
enj.destruction	-0.133849007	-0.036299047	-0.16073078	0.009259578	0.11200957	0.083692598	0.776142637	-0.090681688	-0.090377518
enj.others	0.003682073	-0.816029624	-0.011867555	0.006707298	-0.037166578	-0.055713113	0.016609288	-0.128686424	-0.030512269
enj.react	0.001498028	-0.063049656	0.012292304	-0.026748274	0.020343197	-0.003747062	0.0887173	-0.110610836	-0.758094904
enj.duels	-0.087186065	-0.496774233	-0.027799862	-0.127165245	-0.002014503	-0.05361566	0.057444163	-0.199313797	-0.230483798
enj.strategy	0.022382573	-0.051034535	0.766992718	0.071890228	-0.047006278	-0.020783254	-0.047285164	-0.045719159	-0.069857089
enj.roleplay	0.746449987	0.021622426	-0.038447639	0.166839608	-0.149652181	-0.153266014	-0.074118698	0.048461866	-0.024067174
enj.competition	-0.072174371	-0.543177181	-0.019516923	-0.126702039	0.000592187	-0.031272367	0.052376324	-0.172128333	-0.234140441
enj.decisions	0.050647943	-0.031995304	0.748008703	0.090102861	-0.029359059	-0.008592175	-0.091085353	-0.023473439	0.010560827
enj.common.goal	0.011304656	-0.783751476	0.007026799	0.030888972	-0.090082511	-0.022310064	0.029399189	-0.096039743	-0.003894358
enj.planning	0.028915778	-0.016674121	0.75743781	0.068735348	-0.039888298	-0.06818748	-0.085579151	-0.056124265	-0.0554999
enj.immersion	0.782363354	0.057770766	-0.021477696	0.14353068	-0.139218694	-0.135543798	-0.09520792	0.017437262	-0.023831512
enj.helping	-0.014165047	-0.747697772	0.063897674	0.033737981	-0.058536009	0.021541244	0.011207976	-0.088996448	0.006106507
enj.fast	-0.004332664	-0.084485991	-0.064250039	0.026966054	-0.021514671	-0.041408395	0.10560502	-0.0705196	-0.702322938
enj.guns	-0.090169822	-0.068515393	-0.181505319	-0.009375294	0.096862684	0.082966833	0.764772521	-0.09527889	-0.089491006
enj.gore	-0.094085895	-0.046422238	-0.174624337	-0.020863644	0.108450163	0.104272101	0.77352184	-0.136426005	-0.122309189
enj.blow.up	-0.128113641	-0.057659653	-0.174251166	-0.014467879	0.074702267	0.13220324	0.755725406	-0.03690947	-0.104291934
freq.explore	0.155780173	-0.043758092	0.172913904	0.071927736	-0.751422143	-0.112938279	-0.075760367	-0.052584982	-0.017223136
freq.experiment	0.119996058	-0.073315144	0.165180443	0.054010922	-0.768444312	-0.059991601	-0.11249268	-0.019352852	-0.008214748
freq.study	0.006859127	0.043953247	0.723223878	-0.038178486	-0.101558637	-0.003723349	-0.093597749	0.010857699	0.019281989
freq.char.creation	0.204094833	-0.040846933	0.032966484	0.083402646	-0.085471793	-0.731590779	-0.092061334	-0.012484968	-0.022147156
freq.stats	0.180396181	0.289542302	0.123270367	0.028899411	-0.091215451	-0.172340117	-0.105425794	0.079291825	-0.17221638
freq.customize	0.218492918	-0.020732722	0.003461093	0.078621169	-0.071692519	-0.737738442	-0.122041642	-0.015519001	-0.065318995
freq.test.world	0.152767047	-0.016533113	0.147652175	0.061712845	-0.784860534	-0.10996529	-0.10077049	0.04044551	-0.060196408

I conducted the analysis with Bartlett's Test and the KMO test to check if the data was fit for factor analysis. The Bartlett's Test gave a p-value of zero, and the KMO test scored 0.87, both indicating the dataset was good for analysis. Using PCA, I standardized the data and selected nine key factors, targeting a cumulative explained variance of about 70%. I highlighted the values that are close to 1 and -1 under each factor to find out the characteristics they have. After identifying the factors, I renamed each one by its description and put it back into the dataset for a future analysis.

Rename Factor 1-9 to following:

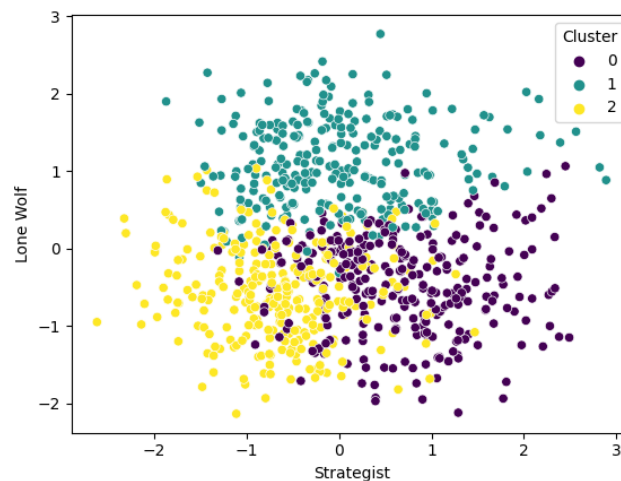
Roleplayer	Emphasizes the importance of role-playing and power progression in a game's alternate reality.
Lone Wolf	Reflects a preference for solitary gameplay over collaborative efforts.
Strategist	Captures the essence of enjoying thoughtful planning and strategic gameplay.
Storyteller	Highlights a player's appreciation for deep storytelling and character development.
Explorer	Describes a player who prefers a straightforward approach to gameplay rather than exploration.
Effortless	Indicates a minimal interest in character or game customization options.
Daredevil	Embodies the thrill of destructive gameplay elements and action.
Achievement Hunter	Signifies the drive to achieve complete in-game success through collecting all items and achievements.
Calm Commander	Represents a player who prefers a less intense and more controlled gaming experience.

b. Next, perform cluster analysis using K-means clustering to identify segments.

Include the cluster centers in your report. Name and interpret these segments based on these cluster centers. Identify the most relevant factors for each segment.

Answer:

Cluster Centers:									
	Roleplayer	Lone Wolf	Strategist	Storyteller	Explorer	Effortless	Daredevil	Achievement Hunter	Calm Commander
Cluster 0	0.433075	-0.476614	0.658846	0.023890	-0.143747	-0.388953	0.015550	-0.130809	-0.039570
Cluster 1	0.155301	1.110122	-0.008569	-0.093305	0.065695	0.101510	-0.013774	0.119559	0.087523
Cluster 2	-0.585134	-0.559299	-0.660209	0.063409	0.084094	0.299163	-0.002834	0.020378	-0.042074

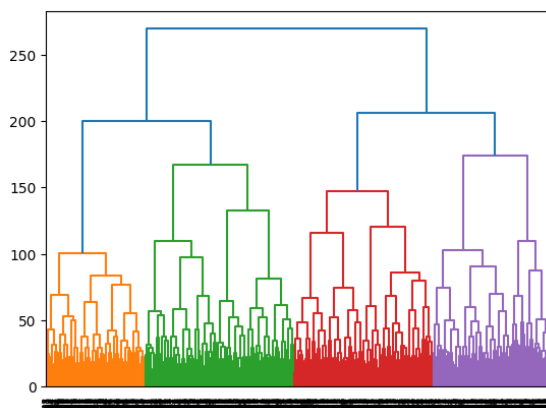


Cluster 0 - “**Coalition Crafters**”: These are gamers who value strategic gameplay and role-playing elements. They prefer games with complex strategies and storylines that allow them to immerse themselves in another character or world. They are less likely to enjoy playing alone, indicating a preference for multiplayer or team-based games.

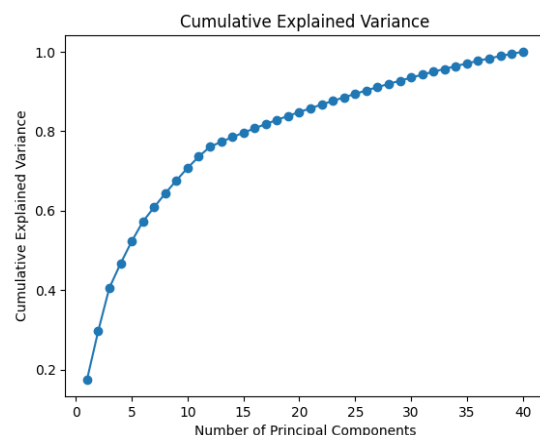
Cluster 1 - “**Party Cows**”: This group thrives on the social aspects of gaming. They are highly motivated by opportunities to connect with others within the gaming experience but show less interest in strategic depth or narrative complexity. Games that facilitate community and shared experiences are likely their top picks.

Cluster 2 - “**Solitary Navigators**”: These individuals enjoy games that allow for exploration and discovery at their own pace. They are not as engaged by competitive strategy or the need for social interaction in gaming, preferring solo adventures that offer expansive worlds to explore with ease and less structure.

For this analysis, I chose to use three clusters, despite the dendrogram suggesting four. This decision was based on multiple runs of K-means clustering because it revealed that the data became overly complex with four clusters and lacking clear distinctions in the plot. While initially considering 11 factors based on cumulative explained variance, I found that incorporating two additional factors led to less satisfactory results compared to using nine.



Dendrogram



Explained variance ratios plot

- c. Finally, use cross tabulation and regression analysis to investigate the relationships between the segments and various demographic attributes (gender, age, income, location). Identify any significant relationships and describe each of the resulting segments in terms of their demographic attributes (% female, average age, and average income) regardless of statistical significance.

Answer:

Gender Table:

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

Chi-squared value: 3.300089289882102
P-value: 0.5089181107756044

		gender	female	male	nonbinary
Segment_Label					
Coalition Crafters	Observed		134	147	3
	Expected		129.47	150.07	4.46
	Chi squared		0.16	0.06	0.48
Party Cows	Observed		127	150	3
	Expected		127.64	147.96	4.4
	Chi squared		0.0	0.03	0.45
Solitary Navigators	Observed		116	140	7
	Expected		119.89	138.97	4.13
	Chi squared		0.13	0.01	1.99

Location Table:

```
xtab(Athena['Segment_Label'], Athena['location'])
```

Chi-squared value: 2.8976918211463443
P-value: 0.5750898129728838

		location	East	Middle	West
Segment_Label					
Coalition Crafters	Observed		104	105	75
	Expected		108.86	104.74	70.4
	Chi squared		0.22	0.0	0.3
Party Cows	Observed		118	99	63
	Expected		107.33	103.26	69.41
	Chi squared		1.06	0.18	0.59
Solitary Navigators	Observed		95	101	67
	Expected		100.81	97.0	65.19
	Chi squared		0.34	0.17	0.05

Age Table:

```
xtab(Athena['Segment_Label'], Athena['Age_Group'])
```

Chi-squared value: 81.97837352315815
P-value: 6.633761219255858e-17

		Age_Group	Middle-aged	Senior	Young
Segment_Label					
Coalition Crafters	Observed		18	1	265
	Expected		30.91	8.93	244.16
	Chi squared		5.39	7.04	1.78
Party Cows	Observed		18	2	260
	Expected		30.47	8.8	240.73
	Chi squared		5.1	5.26	1.54
Solitary Navigators	Observed		54	23	186
	Expected		28.62	8.27	226.11
	Chi squared		22.5	26.25	7.12

Income Table:

```
xtab(Athena['Segment_Label'], Athena['Income_Group'])
```

Chi-squared value: 50.12223408412309
P-value: 3.4047731776720114e-10

		Income_Group	High Income	Low Income	Middle Income
Segment_Label					
Coalition Crafters	Observed		20	186	78
	Expected		26.44	164.84	92.72
	Chi squared		1.57	2.72	2.34
Party Cows	Observed		17	187	76
	Expected		26.07	162.52	91.41
	Chi squared		3.16	3.69	2.6
Solitary Navigators	Observed		40	107	116
	Expected		24.49	152.65	85.86
	Chi squared		9.83	13.65	10.58

I used xtab, for example `xtab(Athena['Segment_Label'], Athena['gender'])` to investigate the relationships between the segments and various demographic attributes. The Income

groups were categorized as follows: Low Income: \$3,000 to \$50,000; Middle Income: \$50,001 to \$100,000; High Income: \$100,001 to \$269,000; For age groups, I categorized Young-aged (18-35), representing the younger generation of gamers. Middle-aged (Ages 36-55) who may have more established gaming preferences and loyalty. And Senior Ages (56-65) represent an older gaming demographic.

After calculating the critical values for demographic data, we found that ‘Gender’ and ‘Location’ do not significantly correlate with clusters, as their Chi-squared values are below 9.488. In contrast, ‘Age’ and ‘Income’ show a significant relationship to clusters, with Chi-squared values of 81.98 and 50.12, respectively. Significant cells in the ‘Age’ table include middle-aged and senior in the ‘Party Cows’ & ‘Coalition Crafters’ while ‘Solitary Navigators’ show significance across all ages. All income cells in ‘Solitary Navigators’ show a significant relationship because its Chi-squared are all greater than 3.84

I only run ‘age’ and ‘income’ groups with the cluster as its data type is Integer, but ‘gender’ and ‘states’ columns are Characters. Thus, I conduct regression analysis for ‘age’ and ‘income’ columns and crosstab analysis for all columns. In the Regression analysis of ‘age’ and ‘Income’ results, **const** represents Cluster 0. 1 represents Cluster 1 and 2 means Cluster 2.

Regression analysis for ‘age’

```
x= pd.get_dummies(Athena['Cluster'], drop_first=True, dtype=int)
x= sm.add_constant(x)
y= Athena['age']
model=sm.OLS(y,x).fit()
model.summary()
```

OLS Regression Results					
Dep. Variable:	age	R-squared:	0.150		
Model:	OLS	Adj. R-squared:	0.148		
Method:	Least Squares	F-statistic:	72.47		
Date:	Sat, 16 Dec 2023	Prob (F-statistic):	1.02e-29		
Time:	22:43:57	Log-Likelihood:	-2980.6		
No. Observations:	827	AIC:	5967.		
Df Residuals:	824	BIC:	5981.		
Df Model:	2				
Covariance Type: nonrobust					
	coef	std err	t	P> t	[0.025 0.975]
const	24.8310	0.529	46.972	0.000	23.793 25.869
1	8.1234	0.762	10.655	0.000	6.627 9.620
2	0.2369	0.750	0.316	0.752	-1.236 1.710
Omnibus:	219.338	Durbin-Watson:	1.937		
Prob(Omnibus):	0.000	Jarque-Bera (JB):	494.023		
Skew:	1.437	Prob(JB):	5.30e-108		
Kurtosis:	5.466	Cond. No.	3.69		

‘Income’

```
x= pd.get_dummies(Athena['Cluster'], drop_first=True, dtype=int)
x= sm.add_constant(x)
y= Athena['income']
model=sm.OLS(y,x).fit()
model.summary()
```

OLS Regression Results					
Dep. Variable:	income	R-squared:	0.054		
Model:	OLS	Adj. R-squared:	0.051		
Method:	Least Squares	F-statistic:	23.33		
Date:	Sat, 16 Dec 2023	Prob (F-statistic):	1.39e-10		
Time:	22:48:07	Log-Likelihood:	-9772.9		
No. Observations:	827	AIC:	1.955e+04		
Df Residuals:	824	BIC:	1.957e+04		
Df Model:	2				
Covariance Type: nonrobust					
	coef	std err	t	P> t	[0.025 0.975]
const	4.609e+04	1950.268	23.633	0.000	4.23e+04 4.99e+04
1	1.711e+04	2812.613	6.083	0.000	1.16e+04 2.26e+04
2	722.7364	2767.928	0.261	0.794	-4710.283 6155.756
Omnibus:	224.519	Durbin-Watson:	1.985		
Prob(Omnibus):	0.000	Jarque-Bera (JB):	645.477		
Skew:	1.348	Prob(JB):	6.86e-141		
Kurtosis:	6.386	Cond. No.	3.69		

The **left model** with ‘age’ column as the dependent variable indicates that approximately 15% of the variance in age can be attributed to the differences in customer segments. This modest R-squared value suggests that while there is some relationship, other unexplored factors may also significantly influence the age distribution within the segments. The F-statistic is highly significant, which implies that the model as a whole is statistically significant. The coefficients for the dummy variables representing the customer segments are positive, with the exception of one segment which shows a negligible relationship with age. This implies that, relative to the base category, membership in certain segments is associated with an increase in age.

The **right model** shows the income-based model exhibits an R-squared of 0.054, indicating that only 5.4% of the income variance is explained by the segment differences. This low R-squared value points to a weak explanatory power of the model, suggesting that customer segments do not majorly influence income levels. Despite the low R-squared, the model is statistically significant, as indicated by the F-statistic. The coefficients for the segments show a mix of positive and negative relationships with income, though these relationships are not as robust as one might expect.

Demographic Attributes:

Coalition Crafters/Cluster 0: 47% female with average age of 25 and average income of 42,298.51.

Party Cows/Cluster 1: 44% female with average age of 33 and average income of 63,201.52.

Solitary Navigators/Cluster 2: 45% female with average age of 25 and average income of 46,814.29.

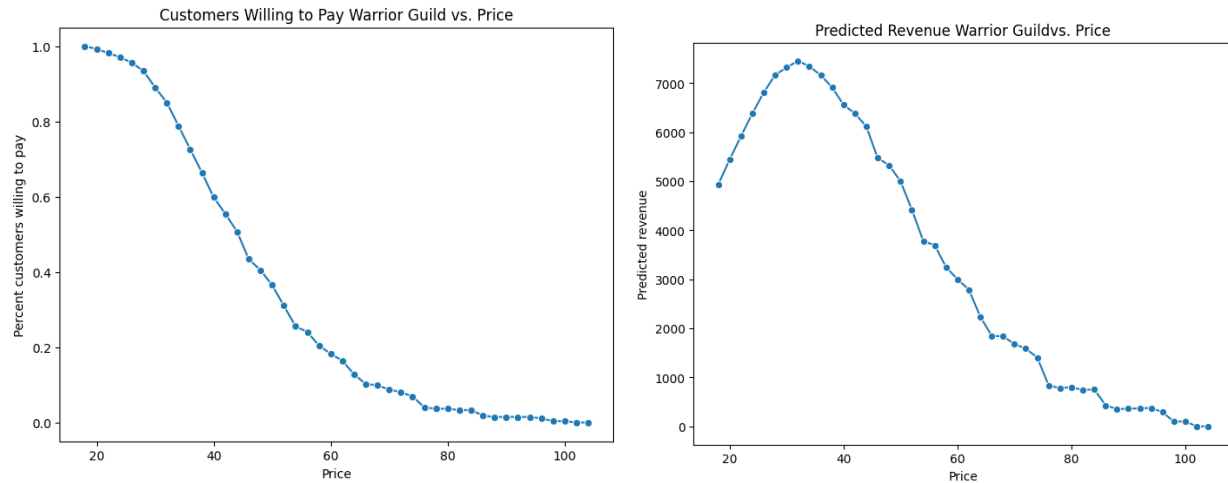
	% Female	Avg Age	Avg income
Cluster 0	0.47183099	24.63	42298.51
Cluster 1	0.44106464	32.95	63201.52
Cluster 2	0.45357143	25.07	46814.29

4. [15pt] Next, investigate another part of the survey: Gabor Granger responses for each game. Each respondent was randomly presented with one of the three games and the survey identified the maximum price point at which each respondent would “probably purchase” the presented game.

- a. For each game, show the two Gabor Granger plots: percent customers willing to pay and predicted revenue as a function of price. What is the ideal price point for each game?

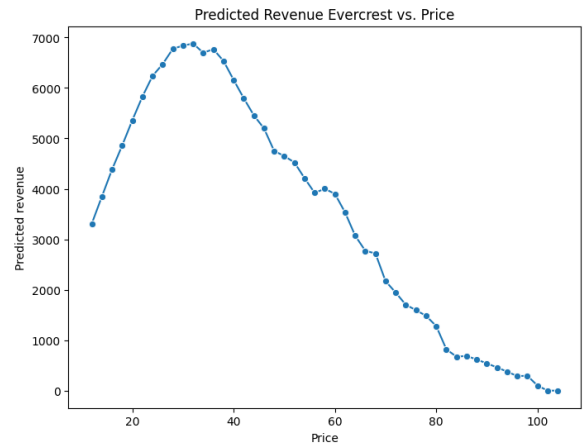
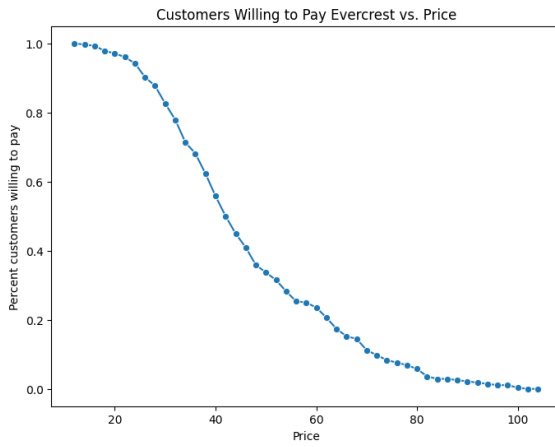
Answer:

The idea price for **Warrior Guild** is \$32.



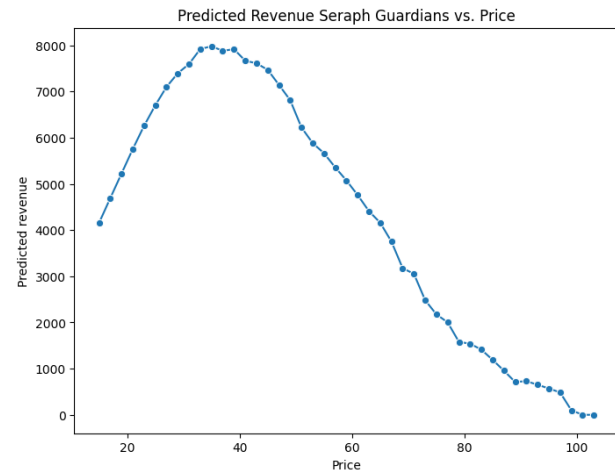
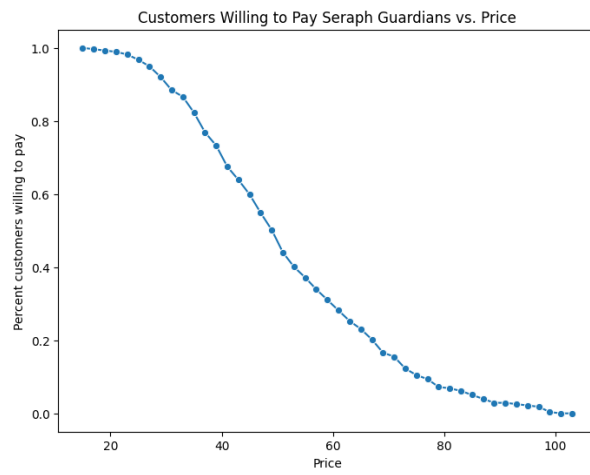
	price	per_customers_wtp	pred_revenue
0	18	1.000000	4932
1	20	0.992701	5440
2	22	0.981752	5918
3	24	0.970803	6384
4	26	0.956204	6812
5	28	0.934307	7168
6	30	0.890511	7320
7	32	0.850365	7456
8	34	0.788321	7344
9	36	0.726277	7164
10	38	0.664234	6916
11	40	0.598540	6560
12	42	0.554745	6384

The ideal price for **Evercrest** is \$32.



	price	per_customers_wtp	pred_revenue
0	12	1.000000	3312
1	14	0.996377	3850
2	16	0.992754	4384
3	18	0.978261	4860
4	20	0.971014	5360
5	22	0.960145	5830
6	24	0.942029	6240
7	26	0.902174	6474
8	28	0.876812	6776
9	30	0.826087	6840
10	32	0.778986	6880
11	34	0.713768	6698
12	36	0.681159	6768
13	38	0.623188	6536
14	40	0.557971	6160

The ideal price for **Seraph Guardians** is \$35.



	price	per_customers_wtp	pred_revenue
0	15	1.000000	4155
1	17	0.996390	4692
2	19	0.992780	5225
3	21	0.989170	5754
4	23	0.981949	6256
5	25	0.967509	6700
6	27	0.949458	7101
7	29	0.920578	7395
8	31	0.884477	7595
9	33	0.866426	7920
10	35	0.823105	7980
11	37	0.768953	7881
12	39	0.732852	7917
13	41	0.675090	7667
14	43	0.638989	7611

- b. Use linear regression to predict which segment is most interested in each game (willing to pay the most). Which segments are most and least interested in each game?

Answer:

The following OLS regression is 'Warrior Guild', the most interested segment is Solitary Navigators, the least interested is Party Cows.

OLS Regression Results						
=====						
Dep. Variable:	gg.maxprice	R-squared:	0.020			
Model:	OLS	Adj. R-squared:	0.013			
Method:	Least Squares	F-statistic:	2.766			
Date:	Mon, 11 Dec 2023	Prob (F-statistic):	0.0647			
Time:	03:33:49	Log-Likelihood:	-1136.6			
No. Observations:	274	AIC:	2279.			
Df Residuals:	271	BIC:	2290.			
Df Model:	2					
Covariance Type:	nonrobust					
=====						
	coef	std err	t	P> t	[0.025	0.975]

const	46.1386	1.533	30.097	0.000	43.120	49.157
Segment_Label_Party Cows	-2.7857	2.268	-1.228	0.220	-7.250	1.679
Segment_Label_Solitary Navigators	2.7250	2.247	1.213	0.226	-1.698	7.148
=====						
Omnibus:	34.278	Durbin-Watson:	1.823			
Prob(Omnibus):	0.000	Jarque-Bera (JB):	43.469			
Skew:	0.897	Prob(JB):	3.64e-10			
Kurtosis:	3.768	Cond. No.	3.58			
=====						

The following OLS regression is 'Evercrest', the most interested segment is Solitary Navigators, the least interested is Party Cows.

OLS Regression Results						
=====						
Dep. Variable:	gg.maxprice	R-squared:	0.018			
Model:	OLS	Adj. R-squared:	0.011			
Method:	Least Squares	F-statistic:	2.516			
Date:	Mon, 11 Dec 2023	Prob (F-statistic):	0.0827			
Time:	03:33:49	Log-Likelihood:	-1185.1			
No. Observations:	276	AIC:	2376.			
Df Residuals:	273	BIC:	2387.			
Df Model:	2					
Covariance Type:	nonrobust					
=====						
	coef	std err	t	P> t	[0.025	0.975]

const	44.9444	1.878	23.926	0.000	41.246	48.643
Segment_Label_Party Cows	-1.4352	2.543	-0.564	0.573	-6.442	3.572
Segment_Label_Solitary Navigators	4.3889	2.757	1.592	0.113	-1.038	9.816
=====						
Omnibus:	20.245	Durbin-Watson:	2.217			
Prob(Omnibus):	0.000	Jarque-Bera (JB):	22.980			
Skew:	0.705	Prob(JB):	1.02e-05			
Kurtosis:	3.100	Cond. No.	3.80			
=====						

The following OLS regression is 'Seraph Guardians', the most interested segment is Solitary Navigators, the least interested is Party Cows.

OLS Regression Results						
Dep. Variable:	gg.maxprice	R-squared:	0.077			
Model:	OLS	Adj. R-squared:	0.070			
Method:	Least Squares	F-statistic:	11.37			
Date:	Mon, 11 Dec 2023	Prob (F-statistic):	1.80e-05			
Time:	03:33:49	Log-Likelihood:	-1176.1			
No. Observations:	277	AIC:	2358.			
Df Residuals:	274	BIC:	2369.			
Df Model:	2					
Covariance Type:	nonrobust					
	coef	std err	t	P> t	[0.025	0.975]
const	48.0645	1.762	27.286	0.000	44.597	51.532
Segment_Label_Party Cows	-1.2714	2.534	-0.502	0.616	-6.260	3.717
Segment_Label_Solitary Navigators	9.5334	2.465	3.867	0.000	4.680	14.387
Omnibus:	11.595	Durbin-Watson:	2.086			
Prob(Omnibus):	0.003	Jarque-Bera (JB):	12.365			
Skew:	0.516	Prob(JB):	0.00206			
Kurtosis:	2.918	Cond. No.	3.72			

- c. Assume that only 30% of respondents who indicated they would “probably purchase” at a given price will actually do so within the first year. Also assume that the survey sample was representative of the approximately 10 million active Steam customers who have expressed interests in similar types of games. What would be the gross and net revenues for each game in the first year?

Answer:

The **gross revenue** for each game is shown below by running the code:

Warrior Guild: 57 million

Evercrest: 56 million

Seraph Guardians: 63.25 million

The **net revenue** for each game is shown below by running the code:

Warrior Guild: 96 million

Evercrest: 96 million

Seraph Guardians: 105 million

Calculation:

```
# Constants
fixed_costs = 7_000_000 # Fixed costs for any game
royalty_rate = 0.05 # 5% royalty rate
valve_share_initial = 0.30 # Valve's share up to $10 million
valve_share_mid = 0.25 # Valve's share between $10 million and $50 million
valve_share_final = 0.20 # Valve's share after $50 million
total_steam_customers = 10_000_000 # Total active Steam customers interested
purchase_probability = 0.30 # 30% of respondents actually purchasing

# Development costs for each game
dev_costs = {
    'Warrior Guild': 5_000_000,
    'Evercrest': 6_000_000,
    'Seraph Guardians': 5_500_000
}

# Ideal prices for each game
ideal_prices = {
    'Warrior Guild': 32,
    'Evercrest': 32,
    'Seraph Guardians': 35
}

# Function to calculate net revenue
def calculate_net_revenue(game, price, dev_cost):
    # Expected Sales Volume
    expected_sales = total_steam_customers * purchase_probability

    # Gross Revenue
    gross_revenue = expected_sales * price

    # Costs (Fixed, Development, Royalties)
    total_costs = fixed_costs + dev_cost + (gross_revenue * royalty_rate)

    # Valve's Share Calculation
    valve_share = 0
    if gross_revenue <= 10_000_000:
        valve_share += gross_revenue * valve_share_initial
    elif gross_revenue <= 50_000_000:
        valve_share += 10_000_000 * valve_share_initial
        valve_share += (gross_revenue - 10_000_000) * valve_share_mid
    else:
        valve_share += 10_000_000 * valve_share_initial
        valve_share += 40_000_000 * valve_share_mid
        valve_share += (gross_revenue - 50_000_000) * valve_share_final

    # Net Revenue
    net_revenue = gross_revenue - total_costs - valve_share
    return net_revenue

# Calculate net revenue for each game
net_revenues = {game: calculate_net_revenue(game, ideal_prices[game], dev_costs[game]) for game in ideal_prices}
net_revenues
```

5. [10pt] The final portion of the part of the survey asked respondents to rank six games with 1 being the most preferred choice. The six games include the three candidate games and three games that competitors have already announced will be on the market.

- a. Assuming all the games are priced equally, that the surveyed customers are representative of the market, and that each customer purchases only one game, calculate the percentage of the market share Athena would have under each of the action alternatives.**

Answer:

Game	Market Share
WarriorGuild	11.970979
SeraphGuardians	53.808948
Evercrest	10.157195
DevilsGate	16.203144
Marksman	1.451028
QuestoftheTitan	6.408706

Total Market Share for Athena = 11.97% + 53.81% + 10.16% = 75.94%

- b. Discuss which of the assumptions above you might want to change, and in what ways, to generate more realistic estimates of market share under each of the action alternatives.**

Answer:

The first assumption is that price plays a crucial role in consumer decision-making. If Athena's games are priced higher than competitors, their market share might decrease, and vice versa. Second assumption is that consumers might purchase more than one game. We'll assume a certain percentage of customers are willing to buy a second game.

- c. **Extra Credit: modify your simulation to actually change some or all of the assumptions you discuss and share the results.**

Answer:

We adjust the model to the following by applying a price sensitivity factor to Athena's games, which reduces their market share if priced higher than competitors. We also factor in the possibility of purchasing a second game. This could increase the overall market share for Athena's games.

After adjusting the model, we got market share for Athena's games is 82.02 based on the code provided below:

```
# Original market shares
market_shares = {
    'WarriorGuild': 11.97,
    'SeraphGuardians': 53.81,
    'Evercrest': 10.16,
    'DevilsGate': 16.20,
    'Marksman': 1.45,
    'QuestoftheTitan': 6.41
}

# Assumption: Price sensitivity reduction (example: 10% reduction in market share if priced higher)
price_sensitivity_reduction = 10

# Assumption: Percentage of customers willing to buy a second game (example: 20%)
second_game_purchase_rate = 20

# Apply price sensitivity
for game in ['WarriorGuild', 'SeraphGuardians', 'Evercrest']:
    market_shares[game] *= (1 - price_sensitivity_reduction / 100)

# Calculate total market share for Athena's games after price sensitivity adjustment
athena_market_share = sum(market_shares[game] for game in ['WarriorGuild', 'SeraphGuardians', 'Evercrest'])

# Adjust for second game purchase
athena_market_share += (athena_market_share * second_game_purchase_rate / 100)

athena_market_share
```

82.01520000000001

P.S. The specific values for price sensitivity and the rate of second game purchases are hypothetical. The values can be changed based on further analysis.

6. [10pt] Provide your final recommendations for each of the key decisions (part 1). As part of your recommendation on positioning, indicate whether you recommend targeting particular segment(s) or a non-targeting strategy. If you recommend a targeted approach, indicate which segment(s) should be targeted and justify your response. If you recommend a non-targeted approach, similarly justify your response.

Answer:

The final recommendation I will give to Athena is to adopt the “Solitary Navigators” (Cluster 2) with its immersive single-player RPG, “Seraph Guardians.” This game is an immersive single player RPG with extensive strategy and puzzle elements. Players work to discover the mythology of the Seraph through strategy, problem-solving, and combat. Solitary Navigators are able to engage the game at their own pace without the competitive pressures of multiplayer environments. The financial analysis supports the profitability of “Seraph Guardians,” making it a compelling choice for Athena’s portfolio by setting the price at \$35. By highlighting the game’s depth and individualistic approach, Athena aims to secure a strong foothold in this niche market. By focusing on this segment for the launch and promotion of Seraph Guardians, Athena stands to not only achieve a successful market entry but also establish enduring brand loyalty. If Athena chooses not targeting, they may miss the opportunity to dominate the market.

Lastly, I would like to mention that the OLS regression analysis using ‘maxprice’ as its Dep. Variable. According to customers’ average income levels, they are willing to pay more for games they like the most. This key finding offers valuable guidance for Athena’s pricing strategy, enabling the company to align its prices with market expectations and optimize revenue opportunities. Opting for a non-targeted approach might fail to consider these crucial spending patterns, resulting in missed opportunities in effectively capturing this specific market segment.

Appendix:

The Elbow curve

