QM222 Section G1

QM222 Project: Returns to College

Part A

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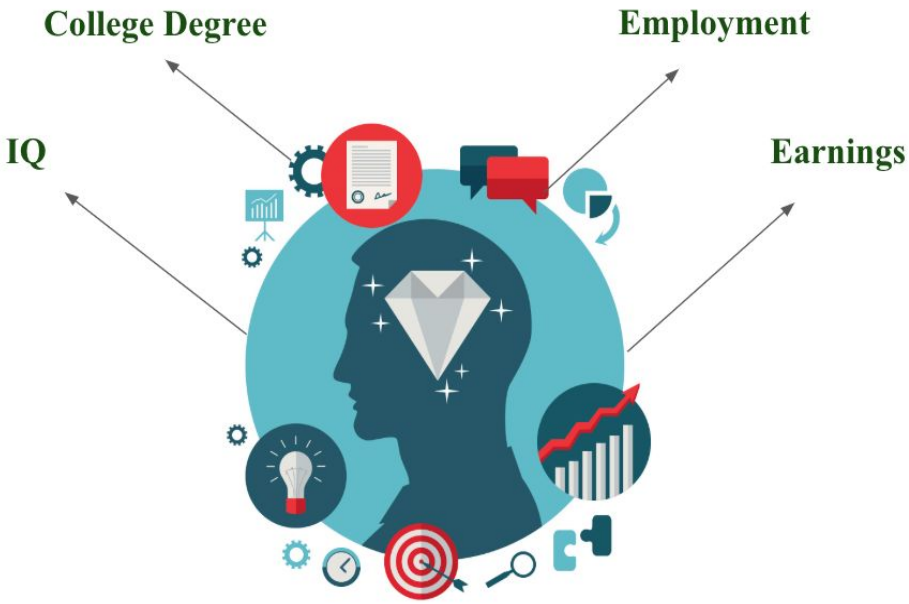


" Cauliflower is nothing but cabbage with a college education "

- Mark Twain

Introduction

In the United States, the number of individuals obtaining a college degree has significantly increased. As a result, there is an ongoing debate on the importance and benefit of receiving a college education. This report aims to solve the question if going to college is a good investment by analyzing the effects (in terms of annual earnings) of a college degree. Part A of the report focuses on exploring the source of the gap between non-college graduates and college graduates, using descriptive statistics and graphing commands.

To make the dataset unique, we identified a member of our group that went **first** when our **last** names were ordered alphabetically. Therefore, Tegveer Ghura, who's ID number is U73744276, went first and, hence, we erased 300 observations starting from row 737 through row 1036 of our dataset.

Q1.

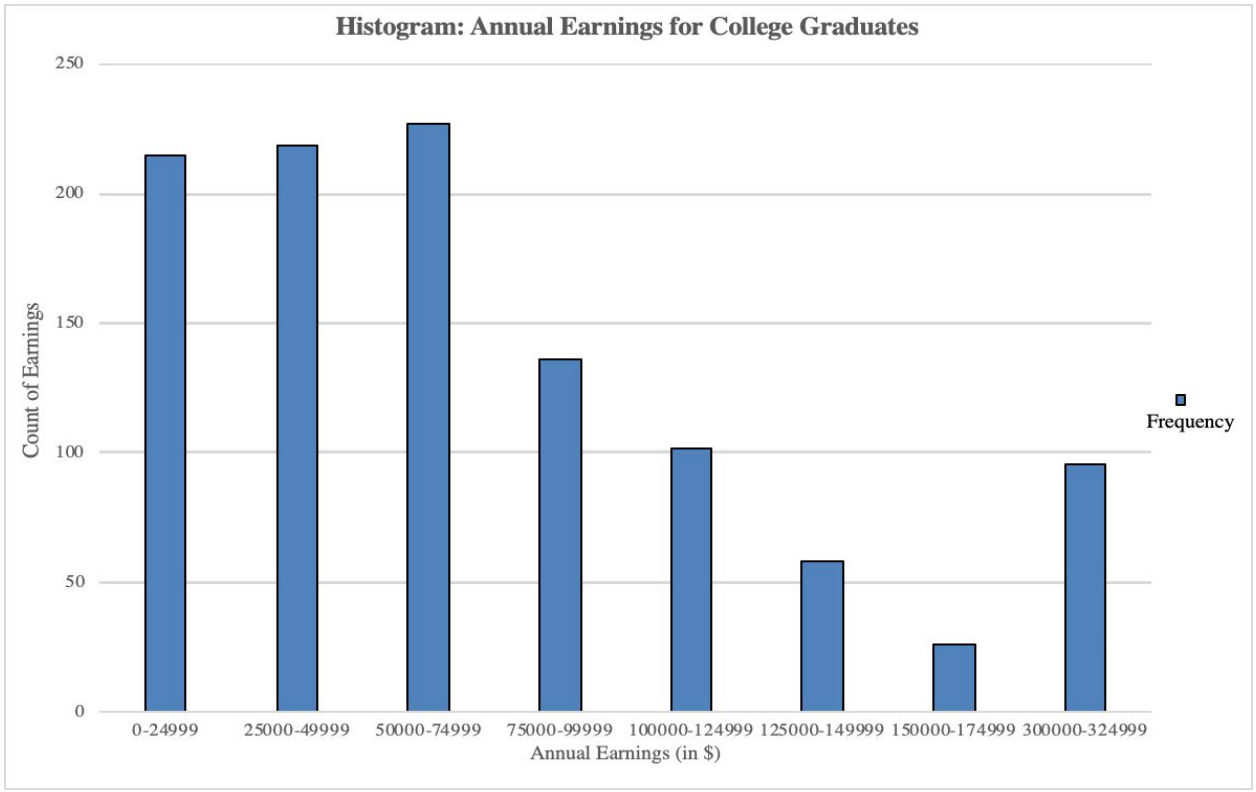
The summary statistics generated through the Excel queries have been presented below.

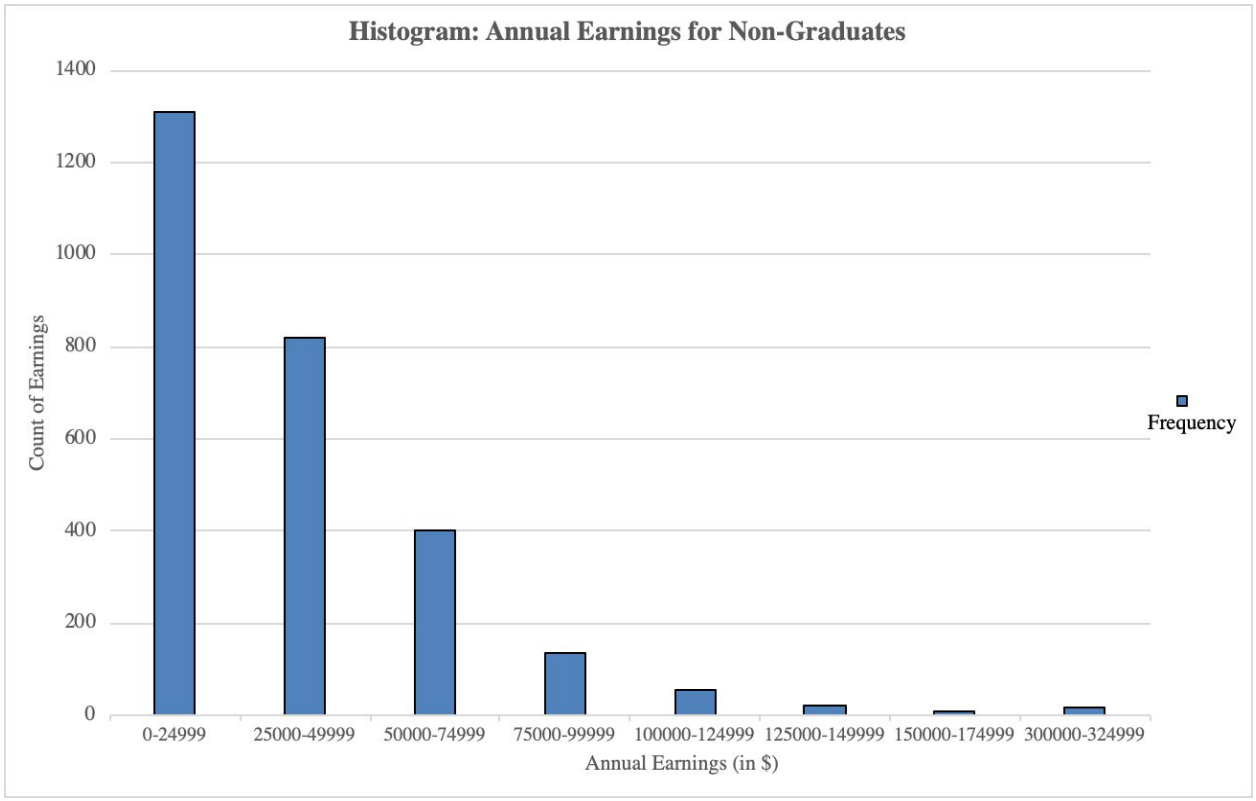
Descriptive Statistics of Annual Earnings	*College Graduates*	*Non-Graduates*
Mean	$81,771.28	$32,465.28
Median (50th Percentile)	$60,000	$26,000
Minimum	$0	$0
Maximum	$312,324	$312,324
Range (Maximum - Minimum)	$312,324	$312,324
Standard Deviation	$82,124.76	$36,104.31
25th Percentile (First Quartile)	$33,000	$4,500
75th Percentile (Third Quartile)	$100,000	$47,000
InterQuartile Range (75th Percentile - 25th Percentile)	$67,000	$42,500

Summary Statistics Explanation:

As can be seen from the table above, the mean and median Annual Earnings for college graduates are significantly higher than that of non-graduates. Both graduates and non-graduates have a minimum value of $0 for 'Annual Earnings', which means that both categories include people who are unemployed or actively searching for work and, hence, in the labor force. However, it does not necessarily include the non-employed, which are the people who work zero hours due to sickness, retirement, or being voluntarily out of the labor force. Both categories reported the same maximum 'Annual Earnings' and, hence, resulted in the same range too. Moreover, it is no surprise that the standard deviation for graduates is much higher than that of non-graduates, delineating the fact that data is more spread out for graduates than for non-graduates. Lastly, we see a considerable difference in the 25th percentiles for both groups, representing the fact that the first 25% of observations for graduates had 'Annual Earnings' of $33,000 and for non-graduates $4,500, when observations are arranged ascendingly according to their Annual Earnings. We also see a considerable difference in the 75th percentiles for both groups, representing the fact that the 75% of observations for graduates had 'Annual Earnings' of $100,000 and for non-graduates $47,000, when observations are arranged ascendingly according to their 'Annual Earnings'.

Q2.

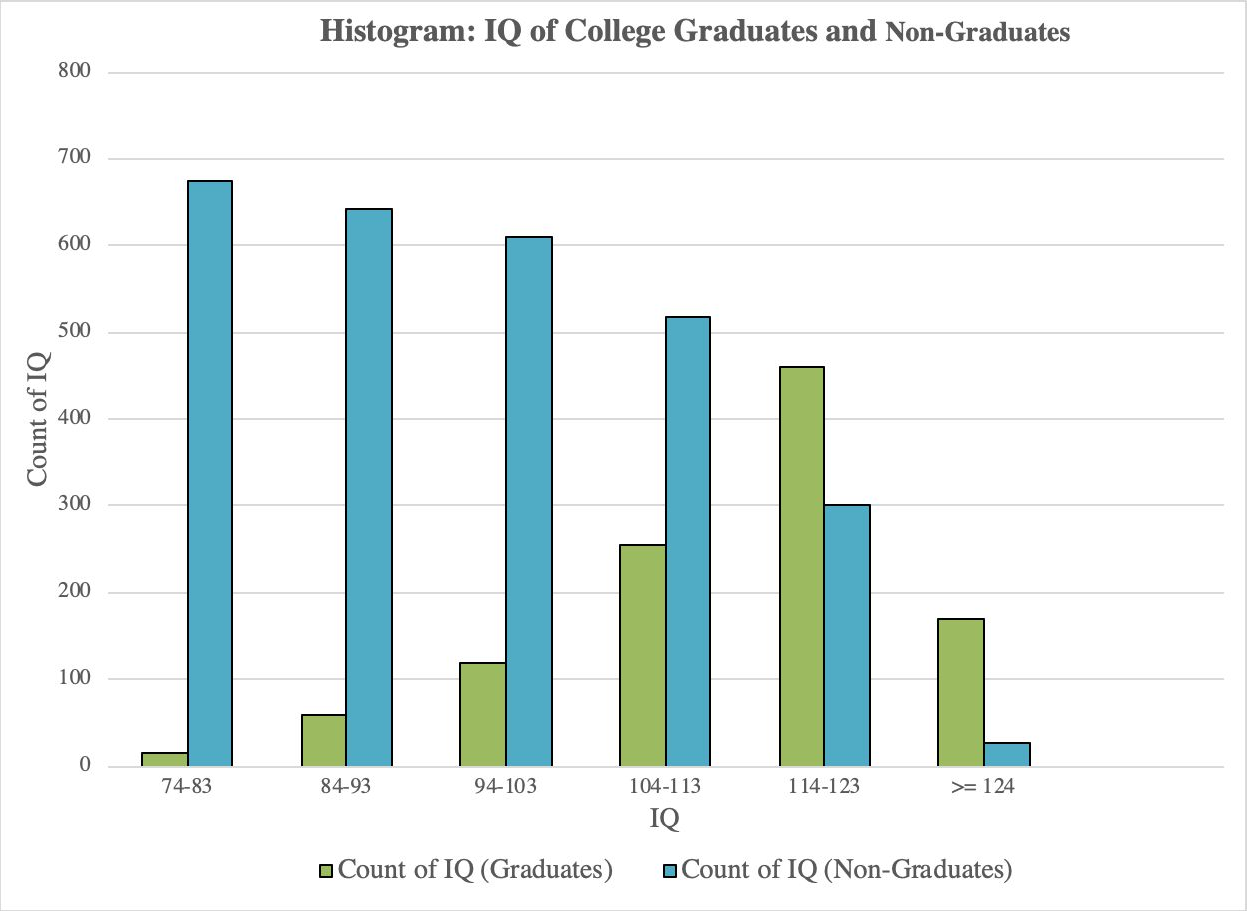

Histogram: Annual Earnings for College Graduates
250
200
150
100
50
0
Count of Earnings
0-24999
25000-49999
50000-74999
75000-99999
100000-124999
125000-149999
150000-174999
300000-324999
Annual Earnings (in $)
Frequency


Histogram: Annual Earnings for Non-Graduates
1400
1200
1000
800
600
400
200
0
Count of Earnings
0-24999
25000-49999
50000-74999
75000-99999
100000-124999
125000-149999
150000-174999
300000-324999
Annual Earnings (in $)
Frequency

Annual Earnings for Non-Graduates and Graduates Explanation:

The frequency of non-graduates with an annual earnings range between $0 and $25,000 is approximately six times greater than that of college graduates, implying that a majority of non-graduates annually earn in the lowest bracket. Also, as annual earnings increase for non-graduates, the number of people with those respective earnings decreases, signifying a negative trend between annual earnings and the number of people. However, this trend is positive for graduates when earnings are between $0 and $75,000 but begin to taper after, with the mode of earnings corresponding to the $50,000-$74,999 range. Therefore, the histogram for non-graduates is highly skewed to the right unlike the histogram for graduates, signifying higher earnings inequality among non-graduates. It should also be noted that the data, for both graduates and non-graduates, did not include any observations of earnings between $175,000 and $300,000. Lastly, a much higher frequency of graduates reported to earn between $125,000 and $325,000 than non-graduates did, even though the number of observations for non-graduates was approximately 2.5 times higher than that of graduates. This inference further reinforces our claim that earnings among non-graduates are much more inequitable than for graduates.

Q3.



IQ of College Graduates and Non-Graduates Explanation:

It's evident from the histogram above that IQ for college graduates is highly skewed to the left or negatively skewed and IQ for non-graduates is highly skewed to the right or positively skewed. As a result, the mean IQ of non-graduates is greater than their median and median IQ for graduates is greater than their mean. Also, it should be noted that the number of observations for non-graduates was more than double than that of graduates. Therefore, this implies that graduates have more number of people, on average, with higher IQ scores than non-graduates do.

Q4.

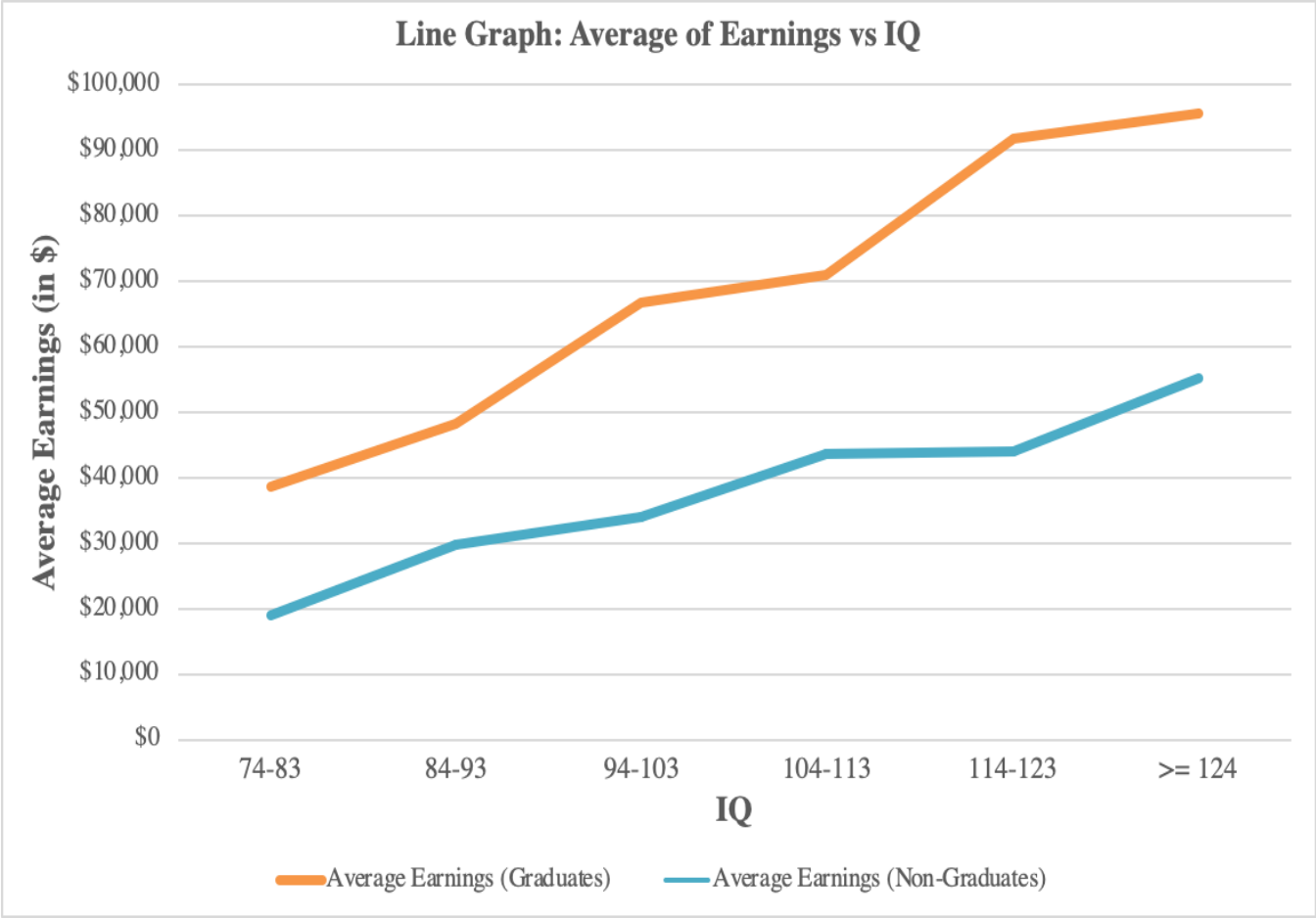
Pivot Tables of Average Earnings for College-Graduates and Non-Graduates by IQ:

IQ	Average of Earnings in $ (Graduates)
74-83	$ 38,733.33
84-93	$ 48,323.84
94-103	$ 66,924.73
104-113	$ 71,139.36
114-123	$ 91,978.12
>= 124	$ 95,704.72
Average Grand Total	**$ 81,771.29**

IQ	Average of Earnings in $ (Non-Graduates)
74-83	$ 20,144.01
84-93	$ 29,335.48
94-103	$ 35,329.31
104-113	$ 41,302.74
114-123	$ 44,058.68
>= 124	$ 51,227.58
Average Grand Total	**$ 32,465.29**

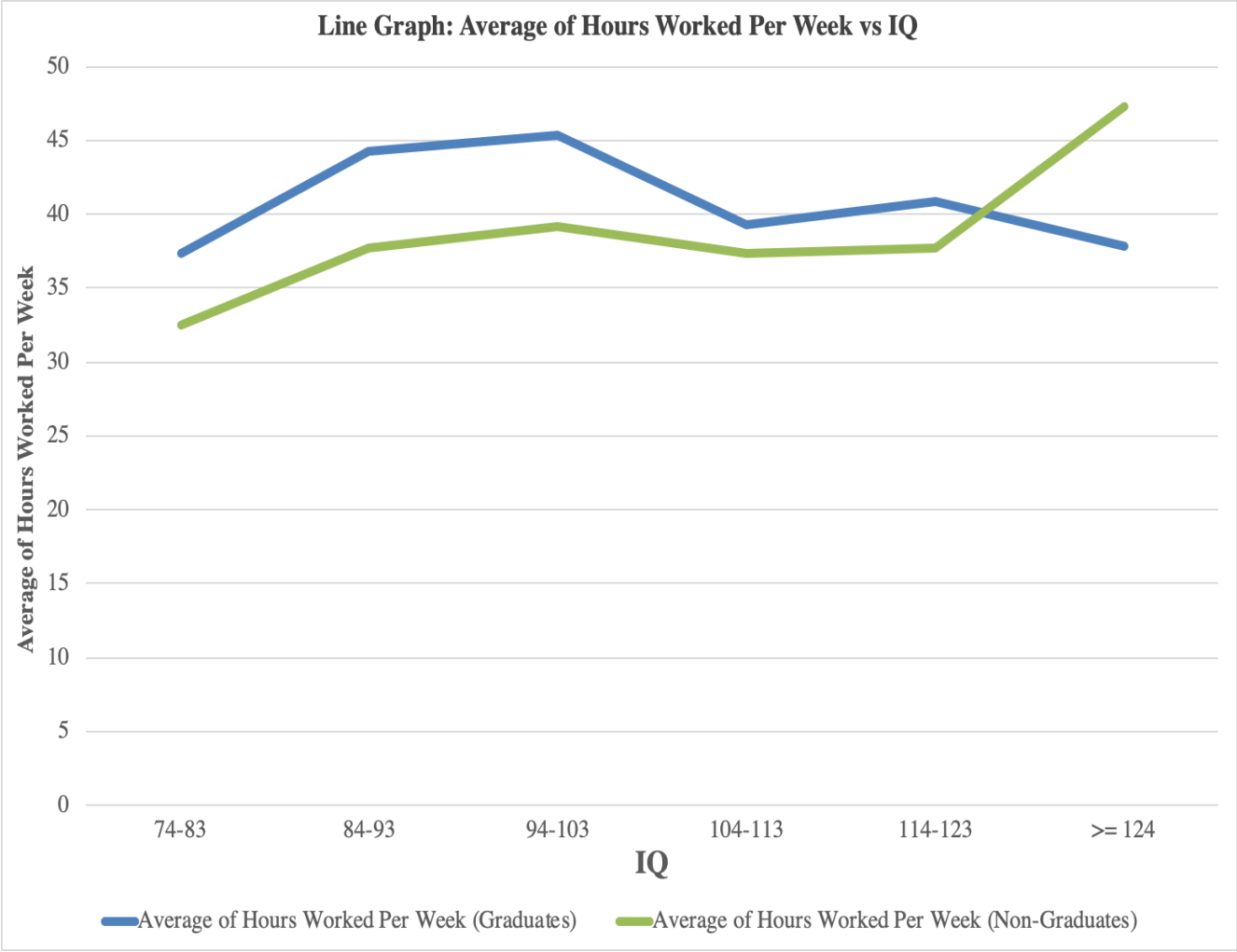
Q5.

Average of Earnings vs IQ for Graduates and Non-Graduates:



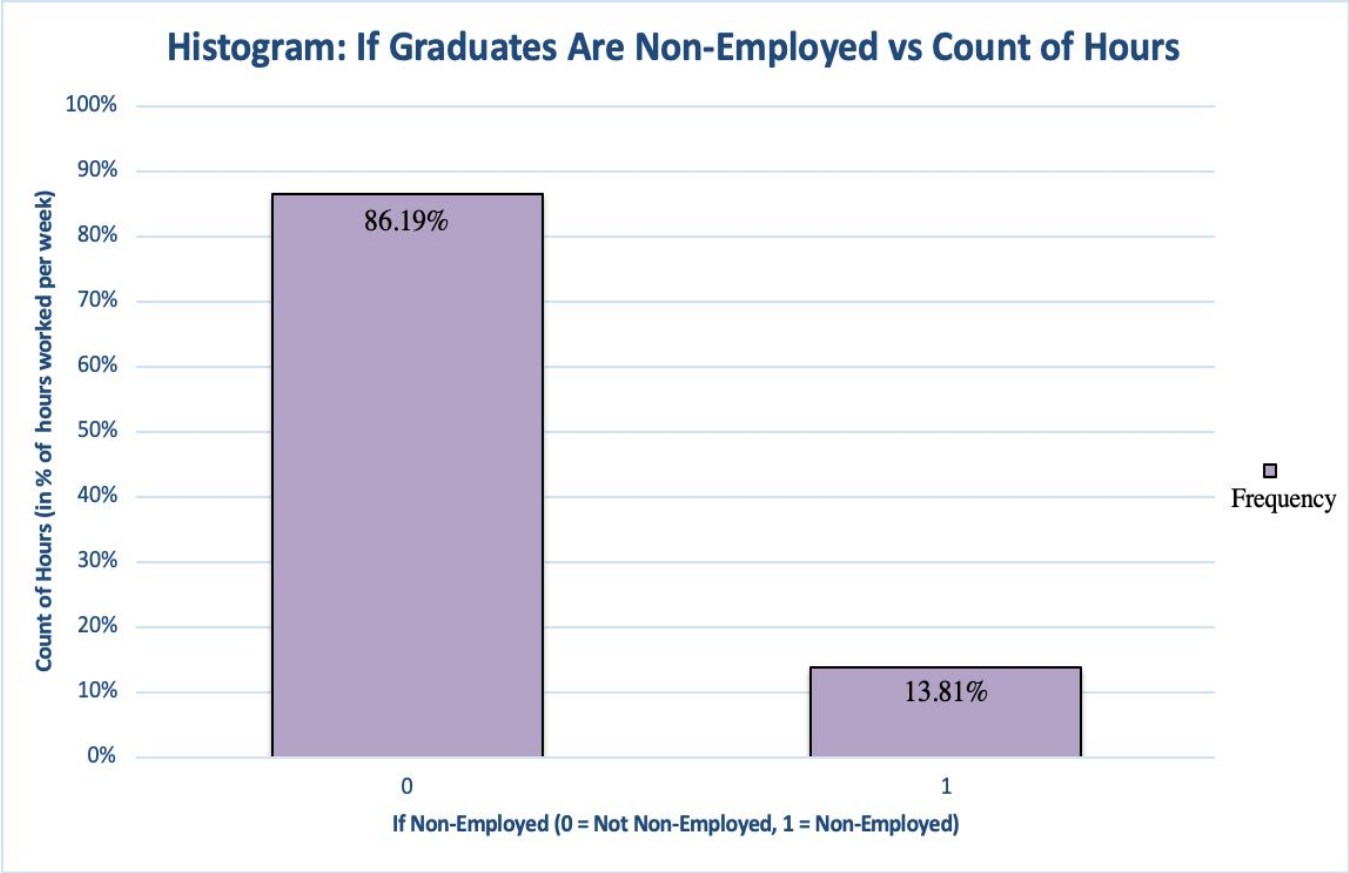
Q6.

Average of Hours Worked Per Week vs IQ for Graduates and Non-Graduates:



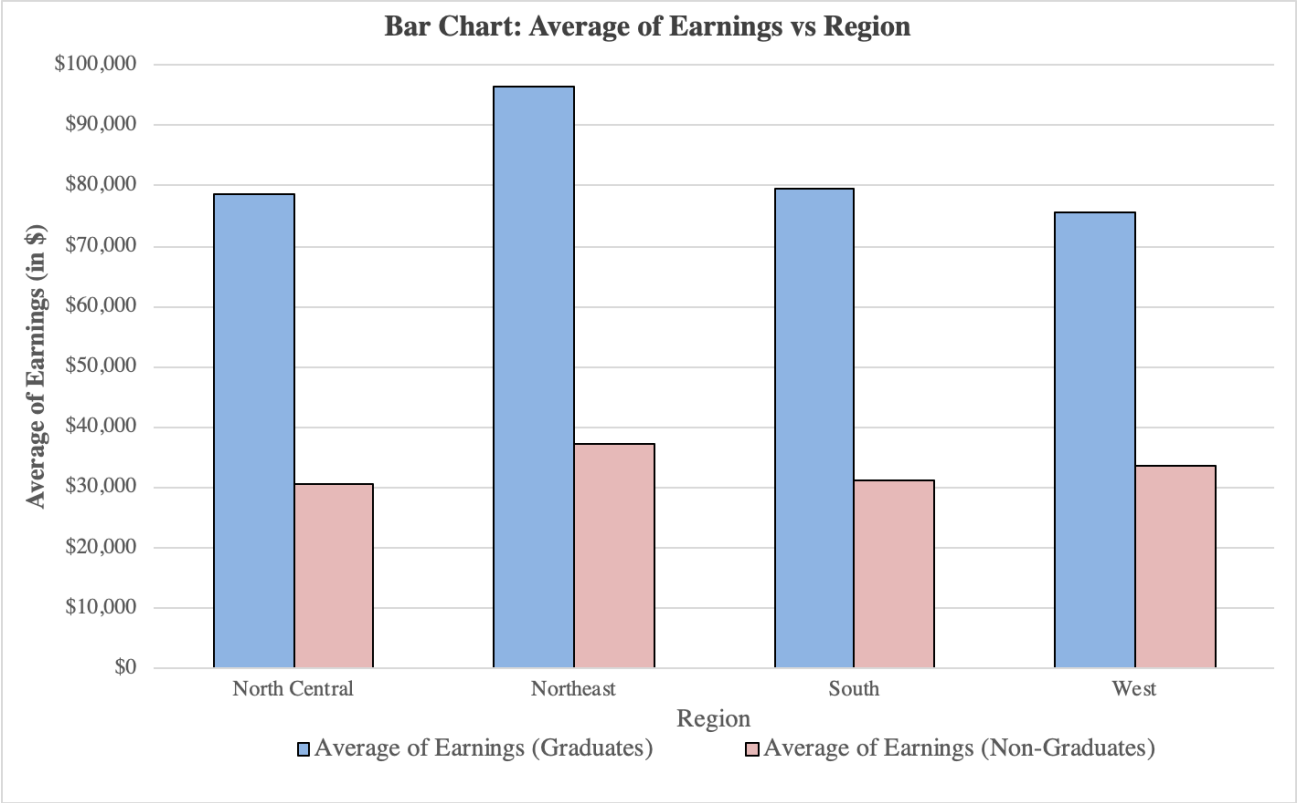
Q7.

<u>Number of Graduates Non-Employed vs Count of Hours:</u>



Q8.

Average of Earnings vs Region for Graduates and Non-Graduates:



College Graduate and Non-Graduate Earnings Gap vs Region Explanation:

The college graduate and non-graduate earnings gap vary when compared to each other. However, throughout each region, you can see that non-graduate make an average earning between $30,000 to $40,000. While college graduates statistically make a greater amount ranging from $70,000 to $100,000. The difference in the earning gap demonstrates the significance of obtaining a college education. One can conclude that it is more likely to have a higher salary if you have a college education. Lastly, the Northeast region has the largest gap in earnings between both college graduates and non-graduates.

Conclusion

Based on the information gathered using descriptive statistics and graphing commands. The report can conclude that going to college is more likely to lead to a higher salary and college is worth the investment. The mean and median 'Annual Earnings' for college graduates are significantly higher than those of non-graduates; the frequency of non-graduates with an annual earnings range between $0 and $25,000 is much greater than that of the graduates. This means that the majority of non-graduates annually earn in the lowest bracket. Additionally, the frequency of graduates who had higher IQ was in a higher bracket than the non-graduates were. Additionally, we concluded that the IQ of graduates also translated to higher earnings compared to the non-graduates according to our line graphs. Lastly, we noted that the average earnings for both graduates and non-graduates were consistent throughout the North Central, South, and West regions, with the Northeast producing the highest average earnings for both categories. Therefore, one can conclude that college degrees do contribute significantly to gaining higher earnings in the future.