

**ASSIGNMENT 1: AIR FRANCE**

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**&**

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**ANSWER 1**

<b>Net Revenue</b>	<b>ROA</b>	<b>Avg Revenue per Booking</b>	<b>Probability of Booking</b>
\$8,776	379487%	975.3277778	0.818181818
\$1,574	251772%	1574.2	0.166666667
\$390	100584%	390.15	0.111111111
\$1,663	71906%	832.575	0.004987531
\$933	42400%	935	0.003144654
\$1,812	34515%	908.65	0.002770083
\$1,680	32237%	1685.55	0.076923077
\$3,784	32070%	1898.05	0.003656307
\$1,508	28926%	1513	0.002232143
\$2,340	28410%	2348.55	0.007751938
\$7,392	27777%	3709.4	0.003577818
\$11,226	24219%	1127.185	0.003153579
\$22,977	23081%	1153.8325	0.015661707
\$48,316	20550%	1867.351923	0.005974265
\$892	18779%	896.75	0.00591716
\$5,702	18522%	1146.65	0.006849315
\$492	18307%	494.7	0.041666667
\$1,806	18170%	1815.6	0.0125
\$1,466	17631%	1473.9	0.000164663
\$467	16915%	470.05	0.5
\$1,774	16563%	1785	0.000456204
\$1,977	16104%	1989	0.009803922
\$2,792	15214%	936.7	0.02189781
\$917	13899%	923.95	0.012658228
\$2,687	13851%	676.6	0.034482759
\$773	13835%	778.6	0.010204082
\$671	13070%	676.6	0.055555556
\$5,595	12895%	1879.35	0.017241379
\$3,229	12726%	1084.883333	0.003605769
\$1,963	12718%	989.4	0.011976048
\$6,818	12326%	1718.275	0.001067521
\$1,821	12120%	918	0.001941748
\$632	11733%	637.5	0.001329787

## Descriptive Statistics:

<i>Engine Click Thru %</i>	
Mean	11.14145058
Standard Error	0.301304742
Median	4.105613718
Mode	100
Standard Deviation	20.23458199
Sample Variance	409.4383084
Kurtosis	17.52822411
Skewness	3.770376525
Range	200
Minimum	0
Maximum	200
Sum	50247.94212
Count	4510

<i>Net Revenue</i>	
Mean	866.2076781
Standard Error	212.1357096
Median	-4.9875
Mode	-0.125
Standard Deviation	14246.2989
Sample Variance	202957032.4
Kurtosis	909.942747
Skewness	27.75691787
Range	558249.9753
	-
Minimum	8725.924987
Maximum	549524.0503
Sum	3906596.628
Count	4510

<i>Trans. Conv. %</i>	
Mean	0.569255075
Standard Error	0.206420496
Median	0
Mode	0
Standard Deviation	13.862485
Sample Variance	192.1684903
Kurtosis	3934.548318
Skewness	60.92945983
Range	900
Minimum	0
Maximum	900
Sum	2567.340387
Count	4510

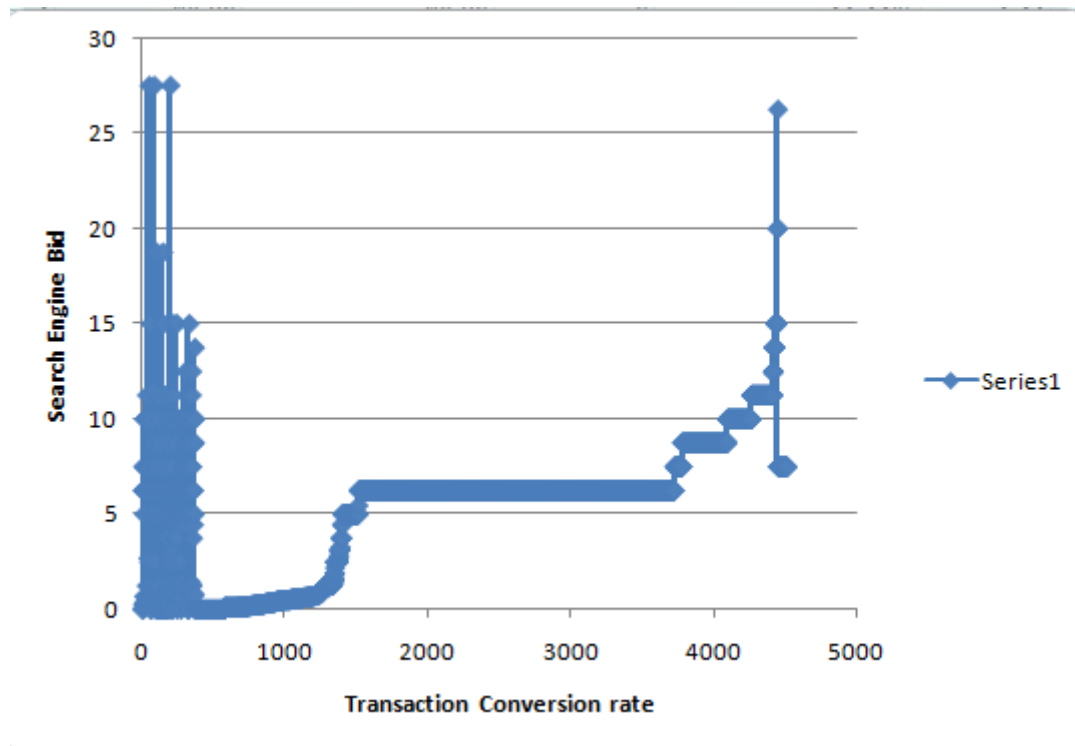
<i>Avg. Cost per Click</i>	
Mean	1.89023958
Standard Error	0.01969093
Median	1.650493419
Mode	0.125
Standard Deviation	1.322374609
Sample Variance	1.748674608
Kurtosis	1.598030882
Skewness	1.091461565
Range	10
Minimum	0
Maximum	10
Sum	8524.980504
Count	4510

<i>ROA</i>	
Mean	4.255573285
Standard Error	1.371566957
Median	-1
Mode	-1
Standard Deviation	92.10968241
Sample Variance	8484.193593
Kurtosis	1398.284314
Skewness	35.92805184
Range	3795.87027
Minimum	-1
Maximum	3794.87027
Sum	19192.63552
Count	4510

<i>Avg Revenue per Booking</i>	
Mean	1024.259502
Standard Error	36.71515237
Median	899.725
Mode	935
Standard Deviation	704.3187405
Sample Variance	496064.8882
Kurtosis	8.892682027
Skewness	2.209180654
Range	5843.75
Minimum	34
Maximum	5877.75
Sum	376927.4966
Count	368

<i>Probability of Booking</i>	
Mean	0.000680949
Standard Error	0.000225602
Median	0
Mode	0
Standard Deviation	0.015150617
Sample Variance	0.000229541
Kurtosis	2150.549636
Skewness	43.73895451
Range	0.818181818
Minimum	0
Maximum	0.818181818
Sum	3.071080607
Count	4510

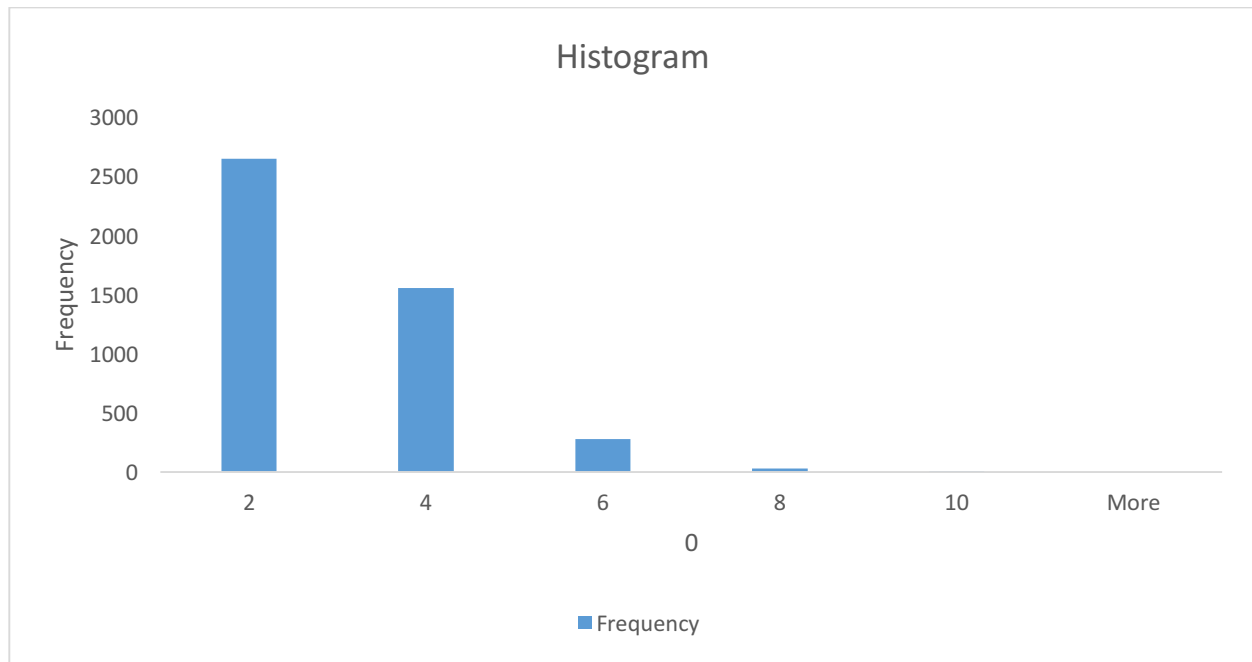
**Scatter Plot: Search engine bid vs. Transaction conversion rate**



Scatter plot is mapped for Search Engine Bid and Transaction conversion rate. Looking at the above scatter plot we can observe that, 'Air France', 'Air Travel in France', 'Air Discount France Ticket' have zero bidding rate. But these key terms have a very high transaction conversion rate.

On the other hand, Key words like, 'France Spain', 'Air France Ticket Paris' have zero transaction conversion rate. By looking at the above observation, we can conclude that, specific key words bidding is competitive and expensive but had very less or even zero transaction conversion rate. With this analysis, a strategy can be adopted to bid for the key words carefully, and to achieve better return on ad.

## Histogram: Average Cost Per Click Vs Frequency



The above histogram chart is plotted against Average Cost Per Click against the Frequency. We can observe from the above table, the average cost per clicks for the different campaigns, and for different publishers was as follows: 0-2 having 2644, 2-4 having 1551, 4-6 having 279, 6-8 having 31 and 8-10 having just 5. By this, we can conclude that, the frequency decreased as the average cost per click increased by a range of 2.

## ANSWER 2a

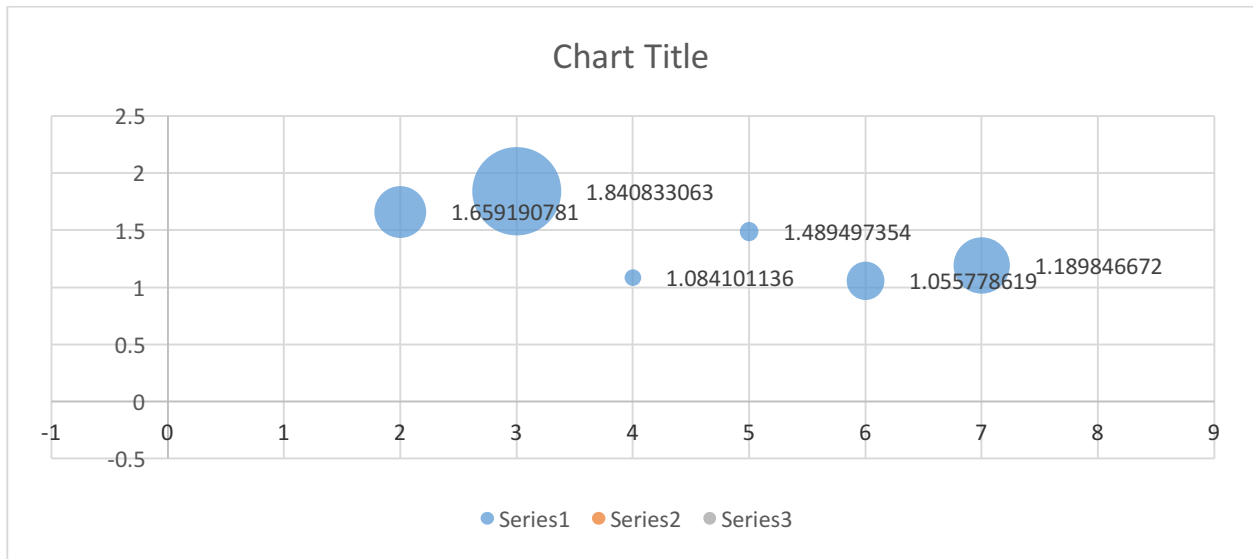
3	Values								
4	Row Labels	Sum of Net Revnue	Sum of Cost per Click	Sum of Total Volume of Bookings	Sum of Average Revenue per Booking	Sum of Return on Ad \$ Spent (ROA)	Sum of Prob of Booking	Sum of Click Charges	Sum of Cost per Booking
5	Google - Global	\$808,603	\$1.66	797	\$1,166	669%	0.0441%	\$120,947	\$151.75
6	Google - US	\$1,391,841	\$1.84	1550	\$1,126	394%	0.0402%	\$353,641	\$228.16
7	MSN - Global	\$133,364	\$1.08	129	\$1,128	1097%	0.0922%	\$12,160	\$94.27
8	MSN - US	\$165,451	\$1.49	140	\$1,297	1028%	0.0823%	\$16,098	\$114.99
9	Overture - Global	\$365,789	\$1.06	372	\$1,156	569%	0.0021%	\$64,296	\$172.84
10	Overture - US	\$205,457	\$1.19	289	\$1,202	145%	0.0017%	\$141,976	\$491.27
11	Yahoo - US	\$836,091	\$1.01	662	\$1,333	1810%	0.0709%	\$46,198	\$69.79
12	Grand Total	\$3,906,597	\$1.47	3939	\$1,184	517%	0.0094%	\$755,316	\$191.75

### Key Observations and Takeaways for Pivot Table:

1. All the campaigns have a positive Return on Ad.
2. All campaigns have positive Revenue Per Booking.
3. Maximum share is taken by Google.
4. Transaction Conversion rate is maximum for MSN and Yahoo, should be explored more.

5. Overture has the least Transaction Conversion Rate, higher the impression can lead to higher cost.
6. The Average Revenue Per Booking is higher than the Cost Per Booking.

### **ANSWER 2b**



From the above Bubble chart, we can observe the following:

1. MSN US, Google US and Google Global have High Probability of Booking and High Cost Per Click.
2. Yahoo and MSN Global have High Probability of Booking and Low Cost Per Click.
3. Overture Global and Overture US have Low Probability of Booking and Low Cost Per Click.
4. Overture US and Google US have comparatively Low Probability of Booking and High Cost Per Click.

### ANSWER 3

#### Bid Strategy Data to improve campaigns within high CPC publishers

Most common characteristics of these high ROA campaigns should be considered for improving the performance of other campaigns

#### TOP 10 Campaigns

Publisher Name	Google - US					
Average of Return on Ad Dollar Spent						
Campaign	Keyword	Match Type	Avg. Pos.	Bid Strategy	Total	
Geo Targeted San Francisco	paris cheap airline	Broad	1.00	Position 5-10 Bid St	32237%	
Air France Branded	air france us	Broad	1.02		23081%	
Geo Targeted New York	france airline ticket	Broad	1.54	Position 5-10 Bid St	18307%	
Geo Targeted Miami	france airfare sale	Broad	1.00	Position 5-10 Bid St	16915%	
Geo Targeted DC	france flights	Broad	1.20	Position 5-10 Bid St	15214%	
Geo Targeted Detroit	international airfares	Broad	3.01	Position 5-10 Bid St	13899%	
Geo Targeted Boston	paris cheap ticket	Broad	1.83	Position 5-10 Bid St	13070%	
Geo Targeted Houston	paris cheap flights	Broad	1.32	Position 5-10 Bid St	12895%	
Google Yearlong 2006	rabat flights	Broad	1.14	Position 1-4 Bid Str	9864%	
Geo Targeted Philadelphia	paris flight	Broad	1.71	Position 5-10 Bid St	8787%	
Geo Targeted Chicago	paris ticket	Broad	1.26	Position 5-10 Bid St	6290%	
Geo Targeted Seattle	paris tickets	Broad	1.69	Position 2-5 Bid Str	4124%	
Geo Targeted Los Angeles	france air flight	Broad	1.14	Position 5-10 Bid St	3793%	
French Destinations	air france to nice	Broad	1.08	Position 2-5 Bid Str	2312%	
Paris & France Terms	air france tickets paris	Broad	1.01	Position 2-5 Bid Str	1467%	

From the Pivot table, we can observe that, keywords like, 'France Airlines Ticket' are the best investment to be made. Air France is not considering a bid strategy and hence are producing organic results and not planning to expand. Let us discuss Bid Strategy for few of the campaigns and conclude which are the best to convert searches to successful Booking. Campaigns that have the Lowest Bid but have the Highest Result are potentially the best.

From the data set we can observe that, broad match types produce the highest ROA. From this we can conclude that, publishers, instead of having exact match for keywords, can set the match type for broad, and gain better access.

Secondly we can observe that, the campaign, Geo Target San Francisco, has the highest ROA. Most of the people from San Francisco, search and convert the search to a purchase. Next comes the Air France Branded, which of course has the same brand as their advertising. People tend to search through their own brand name as the keyword.

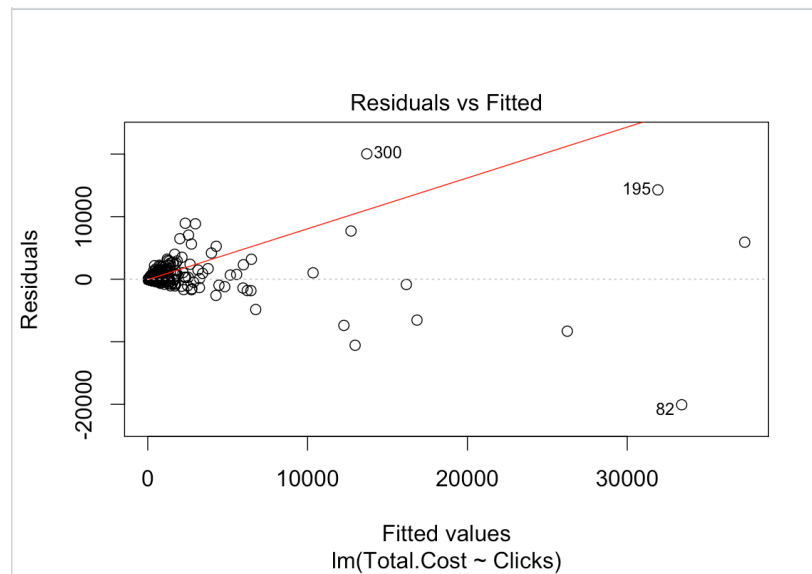
Also, we can observe from the table is, keyword generating higher ROA are related to France, for obvious reasons that people are looking for the keyword Air France. We can also observe that, the keyword 'Paris Cheap Airlines' has a high ROA. This could be because of the term 'Cheap', it tends to capture the people attention. Almost all the terms in the keywords are either related to France or Paris. However, we could observe a keyword 'rabat flight', this keyword can be used by the Moroccans staying in the France.

Finally, let us look at the Average Position and the Bid Strategy. Most of the campaigns have an average position of one. Average Position tells us how the ad is ranked against other ads when a keyword is searched. This can be changed, by bidding the keywords. We can observe that the keyword 'International Airfares' has an Average Position of 3. Which is a lower rank compared to other keyword. This could be mainly because of the term 'International Airfares', as it is the most generic term. The other keywords have either France or Paris in the term, but International Airfare is so generic that people might consider it to be not flying to France and wont click on it. As discussed earlier, most of the campaigners with high ROA fall in 5-10 position in Bid Strategy.



## ANSWER 4

### A. Total Cost and Clicks:



We choose these variables to see the correlation between the total cost and sum of clicks. The result was +0.86, which means that the correlation is strong.

Also, since the result is between 0 to 1, that means that these two variables increase/decrease together. The estimated regression equation:

$$\text{Total Cost} = 42.75 + 1.09\text{clicks}$$

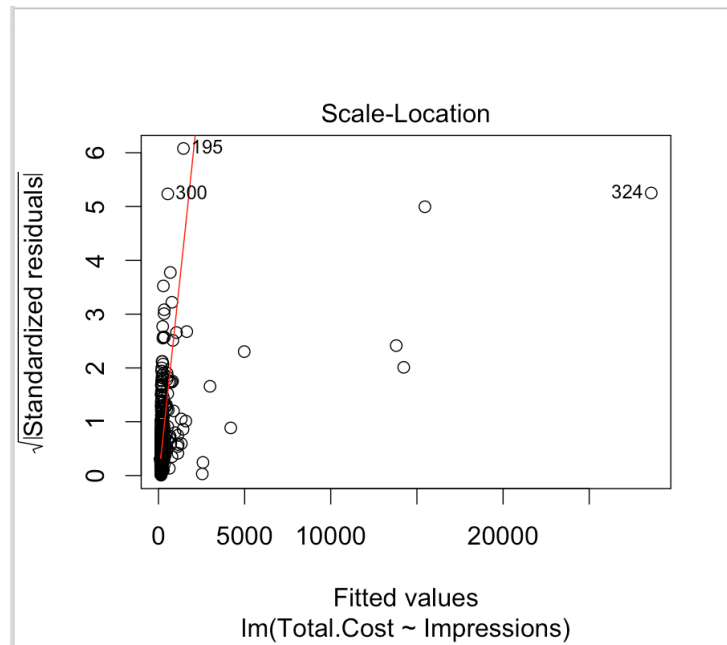
```
Call:
lm(formula = Total.Cost ~ Clicks)

Residuals:
    Min       1Q   Median       3Q      Max
-20069.6   -43.5   -41.1   -33.8   20031.0

Coefficients:
            Estimate Std. Error t value Pr(>|t|)
(Intercept)  42.750093   9.971889   4.287 1.85e-05 ***
Clicks       1.096839   0.009331 117.545 < 2e-16 ***
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 665.9 on 4508 degrees of freedom
Multiple R-squared:  0.754,    Adjusted R-squared:  0.7539
F-statistic: 1.382e+04 on 1 and 4508 DF,  p-value: < 2.2e-16
```

## B. Total Cost and Impressions:



Result was + 0.43, which means that the correlation is weak.

The estimated regression equation:

$$\text{Total Cost} = 1.35 + 3.41 \text{ Impressions}$$

Call:

```
lm(formula = Total.Cost ~ Impressions)
```

Residuals:

Min	1Q	Median	3Q	Max
-22774	-134	-130	-111	44737

Coefficients:

	Estimate	Std. Error	t value	Pr(> t )
(Intercept)	1.358e+02	1.806e+01	7.518	6.67e-14 ***
Impressions	3.412e-03	1.063e-04	32.091	< 2e-16 ***

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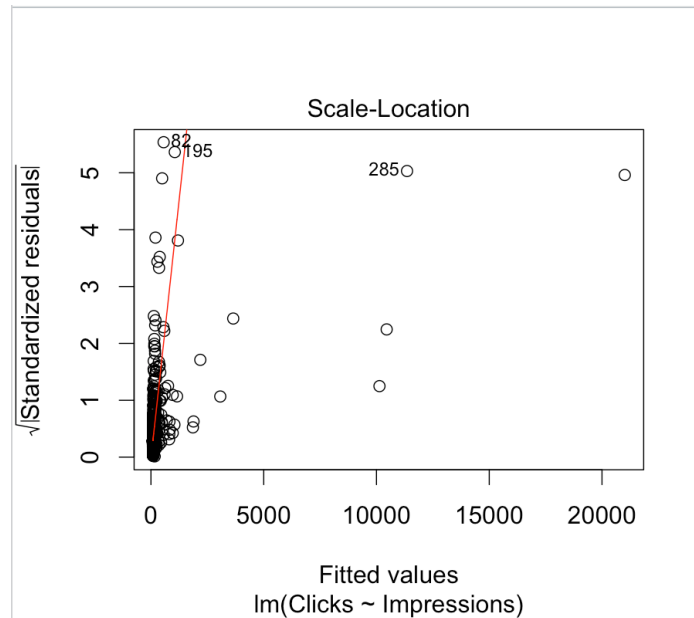
Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 1211 on 4508 degrees of freedom

Multiple R-squared: 0.186, Adjusted R-squared: 0.1858

F-statistic: 1030 on 1 and 4508 DF, p-value: < 2.2e-16

### C. Clicks and Impressions:



Result was +0.4, which means that the correlation is weak.

The estimated regression equation:

$$\text{Clicks} = 9.0 + 2.5 \text{ Impressions}$$

```
> cor(Impressions , Clicks, method = c('pearson'))
[1] 0.400361
> mod3 <- lm( Clicks ~ Impressions)
> summary(mod3)

Call:
lm(formula = Clicks ~ Impressions)

Residuals:
    Min       1Q   Median       3Q      Max
-16338.4   -89.4   -87.1   -75.2  29855.1

Coefficients:
            Estimate Std. Error t value Pr(>|t|)
(Intercept) 9.043e+01  1.452e+01   6.226 5.21e-10 ***
Impressions  2.508e-03  8.549e-05  29.335 < 2e-16 ***
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 973.9 on 4508 degrees of freedom
Multiple R-squared:  0.1603,    Adjusted R-squared:  0.1601
F-statistic: 860.5 on 1 and 4508 DF,  p-value: < 2.2e-16
```

## ANSWER 5

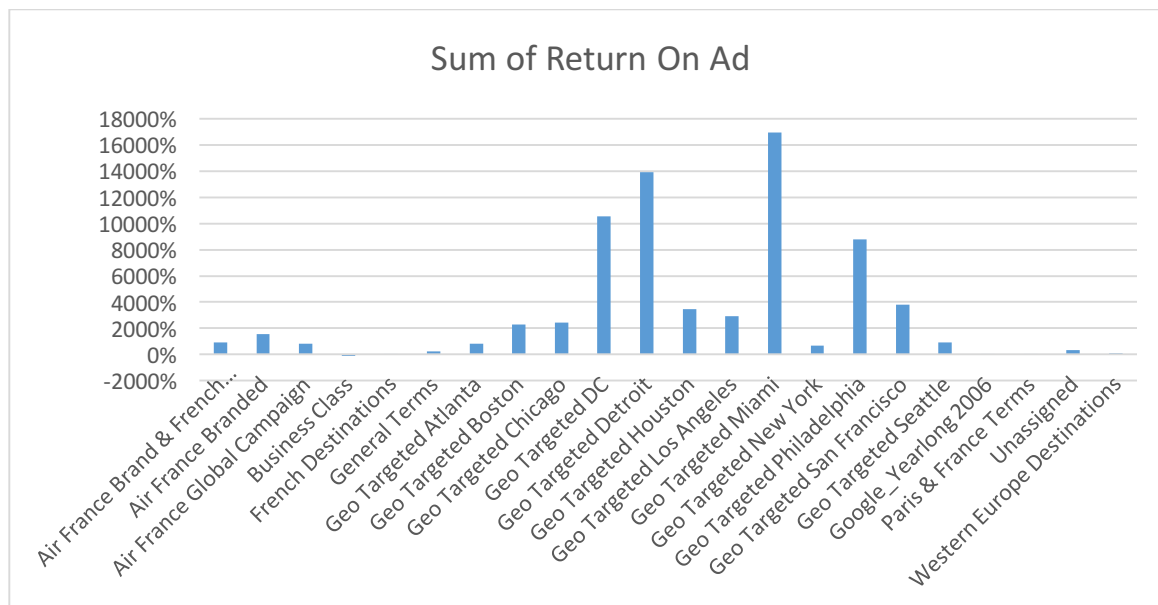
3	Values									
4	Row Labels	Sum of Net Revnue	Sum of Cost per Click	Sum of Total Volume of Bookings	Sum of Average Revenue per Booking	Sum of Return on Ad \$ Spent (ROA)	Sum of Prob of Booking	Sum of Click Charges	TCR2	Sum of CTR2
5	Google - Global	\$808,603	\$1.66	797	\$1,166	669%	0.0441%	\$120,947	0.010933535	0.040310763
6	Google - US	\$1,391,841	\$1.84	1550	\$1,126	394%	0.0402%	\$353,641	0.008068336	0.049824817
7	MSN - Global	\$133,364	\$1.08	129	\$1,128	1097%	0.0922%	\$12,160	0.011500401	0.080133449
8	MSN - US	\$165,451	\$1.49	140	\$1,297	1028%	0.0823%	\$16,098	0.012953368	0.063531625
9	Overture - Global	\$365,789	\$1.06	372	\$1,156	569%	0.0021%	\$64,296	0.006108475	0.003402421
10	Overture - US	\$205,457	\$1.19	289	\$1,202	145%	0.0017%	\$141,976	0.002421997	0.006993294
11	Yahoo - US	\$836,091	\$1.01	662	\$1,333	1810%	0.0709%	\$46,198	0.014518181	0.048854389
12	Grand Total	\$3,906,597	\$1.47	3939	\$1,184	517%	0.0094%	\$755,316	0.007680623	0.012248991

Row Labels	Sum of Media Cost	Sum of Clicks	Sum of Total Bookings	Sum of Total Revenue	Sum of Avg Ticket	Sum of Net Revenue	Kayak Average of Trans. Conv. Rate	Sum of Kayak-CPC
Kayak	\$3,567.13	2,839.00	208	233,694.00	1123.52885	230,126.87	0.0733	\$1.26
Grand Total	\$3,567.13	2,839.00	208	233,694.00	1123.52885	230,126.87	0.0733	\$1.26

In comparison to other publishers (Google, MSN, Yahoo, Overture) Kayak is offering a high Transaction Conversion Rate, and at a lower cost per click. Companies must take advantage of this opportunity to generate more revenue.

## ANSWER 6

Row Labels	Sum of Net Revenue	Sum of Impressions	Sum of Total Cost	Sum of Total Volume of Bookings	Sum of Clicks	Sum of Click Charges	Sum of Amount	Sum of Return On Ad
Air France Brand & French Destinations	712861.4254	515758	75780.47457	699	53838	75780.47457	788641.9	941%
Air France Branded	2208422.638	1246471	141448.2617	1932	141875	141448.2617	2349870.9	1561%
Air France Global Campaign	416178.1002	1332724	51803.84979	367	33107	51803.84979	467981.95	803%
Business Class	-1652.987498	13236	1797.487498	1	313	1797.487498	144.5	-92%
French Destinations	2420.050012	26538	3803.649988	14	1814	3803.649988	6223.7	64%
General Terms	1371.475004	144298	606.4749957	1	518	606.4749957	1977.95	226%
Geo Targeted Atlanta	151.3375	355	18.66249998	1	6	18.66249998	170	811%
Geo Targeted Boston	2758.2375	2341	120.7124988	4	61	120.7124988	2878.95	2285%
Geo Targeted Chicago	6861.587501	2522	282.6624992	5	169	282.6624992	7144.25	2427%
Geo Targeted DC	5143.1125	751	48.6874999	9	21	48.6874999	5191.8	10564%
Geo Targeted Detroit	917.35	79	6.6	1	2	6.6	923.95	13899%
Geo Targeted Houston	6865.825	2328	199.3749996	5	80	199.3749996	7065.2	3444%
Geo Targeted Los Angeles	2111.625	716	72.02499975	2	31	72.02499975	2183.65	2932%
Geo Targeted Miami	467.2875	2	2.7625	1	1	2.7625	470.05	16915%
Geo Targeted New York	31111.75001	37216	4468.39999	46	1788	4468.39999	35580.15	696%
Geo Targeted Philadelphia	429.4625	38	4.8875	1	2	4.8875	434.35	8787%
Geo Targeted San Francisco	3724.6125	469	97.8375	3	51	97.8375	3822.45	3807%
Geo Targeted Seattle	2536.375	1634	281.3749999	4	119	281.3749999	2817.75	901%
Google_Yearlong 2006	5688.875032	516769	16684.82497	15	5013	16684.82497	22373.7	34%
Paris & France Terms	49184.56273	502889	87208.98727	122	27497	87208.98727	136393.55	56%
Unassigned	604639.3007	29802490	172878.6493	661	147361	172878.6493	777517.95	350%
Western Europe Destinations	22804.62507	146035	19299.27493	45	8738	19299.27493	42103.9	118%
Grand Total	4084996.628	34295659	576915.9224	3939	422405	576915.9224	4661912.55	708%



Row Labels	Sum of Return On Ad
Air France Brand & French Destinations	941%
Air France Branded	1561%
Air France Global Campaign	803%
Business Class	-92%
French Destinations	64%
General Terms	226%
Geo Targeted Atlanta	811%
Geo Targeted Boston	2285%
Geo Targeted Chicago	2427%
Geo Targeted DC	10564%
Geo Targeted Detroit	13899%
Geo Targeted Houston	3444%
Geo Targeted Los Angeles	2932%
Geo Targeted Miami	16915%
Geo Targeted New York	696%
Geo Targeted Philadelphia	8787%
Geo Targeted San Francisco	3807%
Geo Targeted Seattle	901%
Google Yearlong 2006	34%
Paris & France Terms	56%
Unassigned	350%
Western Europe Destinations	118%