Regression models for the dataset - Hotel bookings

Research question 1: Does lead time affect the number of booking changes made by the customer?

This is the result of the regression model that was used to test if the lead time was affecting the number of booking changes made by the customer. The model is not significant in predicting the response variable where we have the p-value is 0.9589 which is greater than 0.05 meaning the lead time cannot be a predictor of the number of booking changes the customer made. The change is positive because we have a positive coefficient which means that with 1 unit increase in booking changes then the lead time increases by 0.0243.
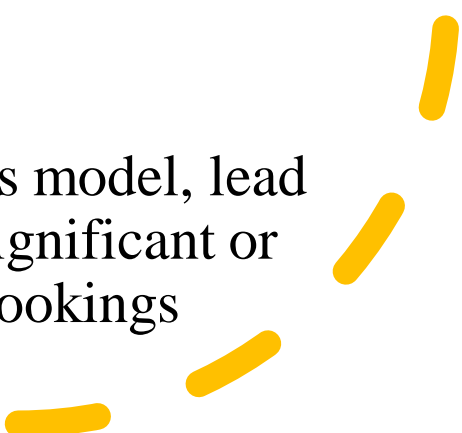
SUMMARY OUTPUT

Regression Statistics

Multiple R	0.00014883
R Square	2.21504E-08
Adjusted R Squa	-8.3539E-06
Standard Error	106.8635434
Observations	119390

ANOVA

	df	SS	MS	F	Significance F
Regression	1	30.19963	30.19962835	0.002644	0.95898724
Residual	119388	1.36E+09	11419.81691		
Total	119389	1.36E+09			

	Coefficients	andard Err	t Stat	P-value	Lower 95%	Upper 95%	ower 95.0%	pper 95.0%
Intercept	104.0060249	0.326562	318.4873558	0	103.3659677	104.6461	103.366	104.6461
booking_change	0.02438189	0.474129	0.051424614	0.958987	-0.904902878	0.953667	-0.9049	0.953667

There are a few possible explanations for why lead time does not seem to affect changes in booking:

- No matter how far in advance a customer books, they can still make plans. Solider plans do not always translate into longer lead times.

- Booking changes may be influenced by more factors than just the time of booking, such as destination, part size, or cost.

- Limitations in the variables studied, data sample size, or assumptions that masked an underlying relationship between the variables could be causing problems for the model.

Overall, the analysis indicates that, using this model, lead time does not appear to have a statistically significant or sufficiently practical impact on changes in bookings

Research question 2: Does the lead time affect the average daily rate?

This model intended to find the relationship between lead time and average daily rate, the model was significant in the predictions where we can see that the p-value is less than 0.05 and the coefficient is -0.02983 which is negative which means that lead time has a negative effect on the average daily rate. That is that with 1 unit increase in lead time then the average daily rate decreased by 0.02982.
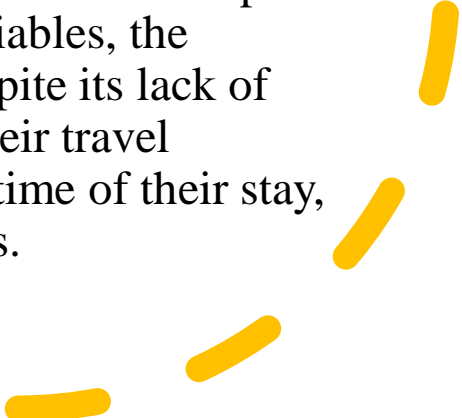
SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.063076853
R Square	0.003978689
Adjusted R	0.003970347
Standard E	50.43536821
Observatic	119390

ANOVA

	df	SS	MS	F	Significance F
Regression	1	1213116.379	1213116.38	476.905219	1.623E-105
Residual	119388	303690403.4	2543.72637		
Total	119389	304903519.8			

	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	ower 95.0%	pper 95.0%
Intercept	104.9336968	0.203691615	515.15963	0	104.5344646	105.3329	104.5345	105.3329
lead_time	-0.02982918	0.00136592	-21.8381597	1.623E-105	-0.03250636	-0.02715	-0.03251	-0.02715

The following are some possible reasons for the inverse relationships between lead time and rates:

- In order to encourage early commitment, hotels and travel agencies may employ dynamic pricing, which involves providing lower introductory rates to those who book earlier. Then, as rooms fill up, rates increases.

- Customers who make reservations further in advance might be more flexible with their choices or price sensitive, giving them more time to look for and select less expensive rates.

- Lead time and seasonality/peak travel dates when rates are higher might be related, but this effect would probably be captured by other factors.

Overall, this model suggests that a longer booking lead time corresponds to lower room rates. Even after adjusting for other variables, the statistical significance of the relationship remains, despite its lack of extreme strength. If customers plan ahead and book their travel arrangements well in advance, as opposed to near the time of their stay, they can reasonably anticipate somewhat reduced rates.

Research question 3: Does the number of adult guests on the booking affect the average daily rate?

The last research question entailed using linear regression to check if number of adult guests on the booking affected the average daily rate. The model was significant because the p-value is less than 0.05 and this indicates that the model was significant and that the number of adult guests affects significantly affects the average daily rate. The coefficient is 20.12 which means that with 1 unit in the number of adult guests then the average daily rate increases by 20.12.

SUMMARY OUTPUT								
Regression Statistics								
Multiple R	0.230641216							
R Square	0.05319537							
Adjusted R Squar	0.05318744							
Standard Error	49.17349388							
Observations	119390							
ANOVA								
	df	*SS*	*MS*	*F*	*Significance F*			
Regression	1	16219455.64	16219455.64	6707.707873	0			
Residual	119388	288684064.1	2418.0325					
Total	119389	304903519.8						
	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*ower 95.0%*	*pper 95.0%*
Intercept	64.47738576	0.477773885	134.9537674	0	63.54095666	65.41381	63.54096	65.41381
adults	20.12156199	0.245682725	81.90059752	0	19.64002782	20.6031	19.64003	20.6031

The correlation between the average daily rates and the number of adult guests may be explained by the following potential causes:

- Variable expenses such as housekeeping, laundry, utilities, and consumables go up as the number of guests rises. Increased average daily rates aid in defraying these additional costs.

- Higher rates also take into account the possibility of increased wear and tear and potential damages due to an increase in guests.

- Rental owners can use per-person pricing, increasing the rate linearly for each additional guest, as each adult probably brings with it additional expenses.

- If a larger group of guests needs a specific property size or amenities to fit them, they might not be as price conscious.

The average daily rate and the number of adult guests had a significant positive relationship, as measured by the linear regression model used in this analysis. It specifically forecasts an increase in average rate of $20.12 for extra adult guest on the reservation. The incremental rate increase per guest is in line with the dynamics of variable costs and pricing strategies used by the vacation rental business. In summary, the number of adult version has a positive effect on average daily rates.