The British Columbia Tourist Association distributes pamphlets, maps, and other tourist-related information to people who call a toll-free number and request information. The marketing manager decided to develop a multiple regression model to predict the number of calls that will be received in the coming week. A random sample of 20 weeks is selected. The collected data are summarized below.

Calls Received	Ads Place Previous Week	Calls Received the Previous Week	Airline Bookings		
345	12	297	3,456		
456	14	502	3,456		
356	13	340	3,600		
605	16	450	5,500		
209	14	350	2,400		
306	10	340	2,890		
457	15	401	3,757		
259	12	340	2,590		
540	13	480	4,840		
460	16	440	3,560		
378	14	348	3,460		
456	16	518	3,679		
209	14	350	2,400		
306	10	340	2,890		
457	15	401	3,757		
259	12	340	2,590		
540	13	480	4,840		
460	16	440	3,560		
356	13	340	3,600		
605	16	450	5,500		

a. Specify a suitable multiple regression equation to estimate with the data.

Ans. The model obtained is

$Y = -205.7074 + 4.0643 X1 + 0.4968 X2 + 0.0978 X3$

Where

Y = Calls Received $X1$ = Ads Place Previous Week $X2$ = Calls Received the Previous Week

$X3$ = Airline Bookings

b. What percentage of the total variation in the number of calls is explained by the regression model?

Ans. As R square = 0.952 , thus 95.2% of the total variation in the number of calls is explained by the regression model .

c. Is the overall multiple regression equation statistically significant? Explain.

Ans.

ANOVA table

Source	SS	df	MS	F	p-value
Regression	267,473.4627	3	89,157.8209	105.63	9.31E-11
Residual	13,505.4873	16	844.0930		
Total	280,978.9500	19			

The F value obtained above is significant as its p value = 9.31E-11 is very less (<0.01).Thus the overall multiple regression equation is statistically significant at 1% level of significance.

d. Which, if any, of the independent variables is statistically significant? Test using a significance level of 0.05.

Ans.

The analysis below shows that all variables except Ads Place Previous Week is significant at 5% as their p values are less than 0.05.Thus variables Calls Received the Previous Week and Airline Bookings are significant at significance level of 0.05 .

Regression output

variables	coefficients	std. error	t (df=16)	p-value
Intercept	-205.7074	50.3646	-4.084	.0009
Ads Place Previous Week	4.0643	4.4825	0.907	.3780
Calls Received the Previous Week	0.4968	0.1430	3.475	.0031
Airline Bookings	0.0978	0.0092	10.579	1.25E-08

Regression Analysis

R^2	0.952		
Adjusted R^2	0.943	n	20
R	0.976	k	3
Std. Error	29.053	Dep. Var.	**Calls Received**

ANOVA table

Source	SS	df	MS	F	p-value
Regression	267,473.4627	3	89,157.8209	105.63	9.31E-11
Residual	13,505.4873	16	844.0930		
Total	280,978.9500	19			

Regression output

variables	coefficients	std. error	t (df=16)	p-value	confidence interval 95% lower	95% upper
Intercept	-205.7074	50.3646	-4.084	.0009	-312.4755	-98.9393
Ads Place Previous Week	4.0643	4.4825	0.907	.3780	-5.4382	13.5668
Calls Received the Previous Week	0.4968	0.1430	3.475	.0031	0.1937	0.7998
Airline Bookings	0.0978	0.0092	10.579	1.25E-08	0.0782	0.1174