**Q1 Community Bank**

Community Bank would like to increase the number of customers who use payroll direct deposit. Management is considering a new sales campaign that will require each branch manager to call each customer who does not currently use payroll direct deposit. As an incentive to sign up for payroll direct deposit, each customer contacted will be offered free checking for two years.

Because of the time and cost associated with the new campaign, management would like to focus their efforts on customers who have the highest probability of signing up for payroll direct deposit. Management believes that the average monthly balance in a customer’s checking account may be a useful predictor of whether the customer will sign up for direct payroll deposit.

To investigate the relationship between these two variables, Community Bank tried the new campaign using a sample of 50 checking account customers who do not currently use payroll direct deposit. The sample data show the average monthly checking account balance (in hundreds of dollars) and whether the customer contacted signed up for payroll direct deposit (coded 1 if the customer signed up for payroll direct deposit and 0 if not). The data are contained in the data set named **Bank**.

1. Write the generic logistic regression equation relating x to y.
2. For the Community Bank data, use software to compute the estimated logistic regression equation.
3. Estimate the probability that customers with an average monthly balance of $1000 will sign up for direct payroll deposit.
4. Suppose Community Bank only wants to contact customers who have a 0.50 or higher probability of signing up for direct payroll deposit. What is the average monthly balance required to achieve this level of probability?
5. What is the estimated odds ratio? What is its interpretation?

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**Q2 Lakeland College**

Last year Lakeland College started a voluntary one-week orientation program to help first-year students adjust to campus life. If Lakeland is able to show that the orientation program has a positive effect on retention, they will consider making the program a requirement for all first-year students. Lakeland’s administration also suspects that students with lower GPAs have a higher probability of leaving Lakeland at the end of the first year. In order to investigate the relation of these variables to retention, Lakeland selected a random sample of 100 students from last year’s entering class. The data are contained in the data set named **Lakeland**.

The dependent variable was coded as y = 1 if the student returned to Lakeland for the sophomore year and y = 0 if not.

The two independent variables are:

X1 = GPA at the end of the first semester

X2 =0 if the student did not attend the orientation program

=1 if the student attended the orientation program

1. Write the logistic regression equation relating X1 and X2 to y.
2. What is the interpretation of E(y) when X2 = 0?
3. Use both independent variables and software to compute the estimated model equation
4. Use α = 0.05 to determine whether each of the independent variables is significant.
5. Estimate the probability that students with a 2.5 grade point average who did not attend the orientation program will return to Lakeland for their sophomore year.   
   What is the estimated probability for students with a 2.5 grade point average who attended the orientation program?
6. What is the estimated odds ratio for the orientation program? Interpret it.