**Chapter Problems: Survival Analysis and Data Visualization**

20 questions, 30 points

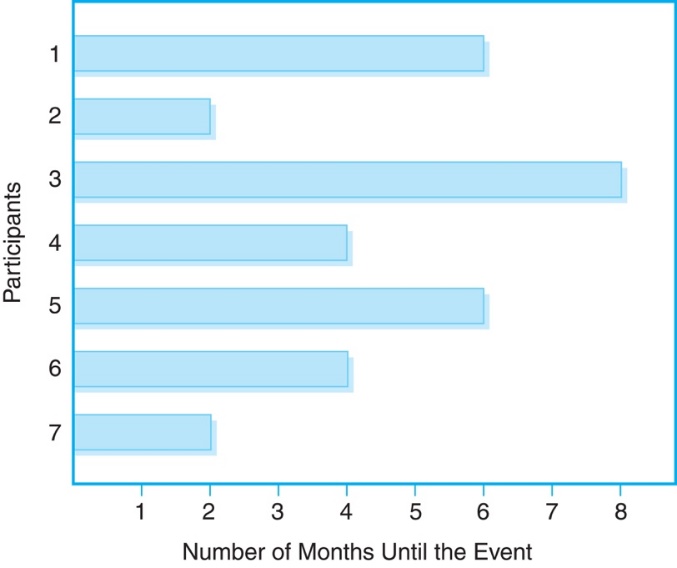
**Chapter 11**

**Multiple Choice**

1. A Cox proportional hazards model is estimated relating time to psychiatric hospitalization in patients with severe mental illness. The risk factors include age, sex, prior hospitalization for mental illness, and an indicator of bipolar disorder. The parameter estimates and significance levels for the model are shown here. Which of the predictors are statistically significantly associated with time to psychiatric hospitalization?

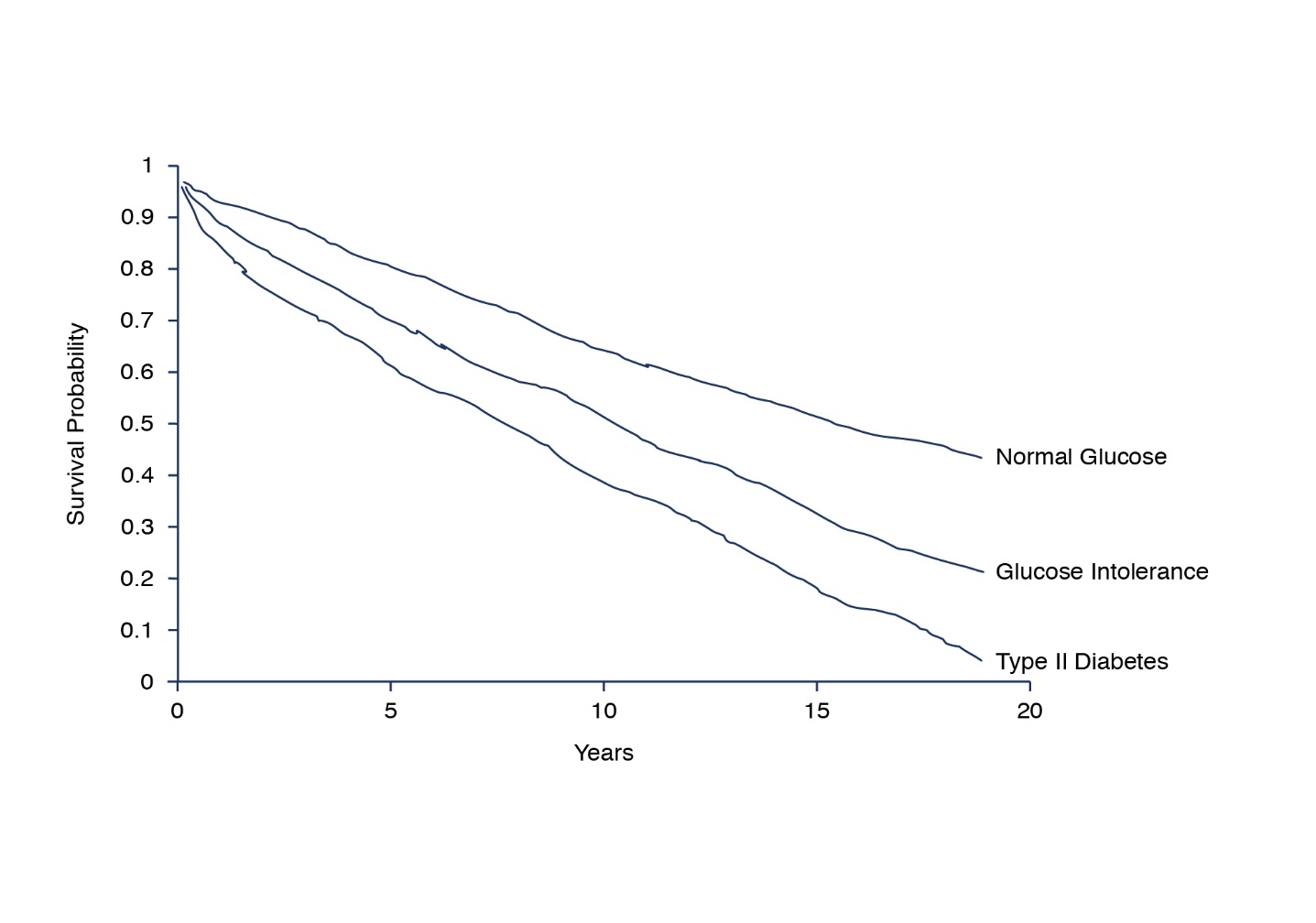
|  |  |  |
| --- | --- | --- |
| Predictor | Parameter Estimate | *p*-value |
| Age, years | 0.0045 | 0.5647 |
| Sex (0 = female, 1 = male) | –0.4841 | 0.0341 |
| Prior hospitalization (0 = no, 1 = yes) | 0.3726 | 0.6178 |
| Bipolar disorder (0 = no, 1 = yes) | 0.7561 | 0.0042 |

1. Sex & Bipolar disorder
2. Sex & Age
3. Prior hospitalization & Bipolar disorder
4. None of Above

2. The assumption that participant number 3 in the study below never developed the event of interest would likely lead to which of the following statistical errors?

1. Non-informative censoring
2. Statistical censoring
3. Right censoring
4. Left censoring

3. The figure below shows survival probabilities from all-cause mortality over 20 years in participants over 50 years of age who have normal glucose, glucose intolerance, and Type II diabetes mellitus. Estimate the 5-year survival probability for Type II diabetes.

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1. approximately 10%
2. approximately 60%
3. approximately 76%
4. approximately 84%

4. Assume the below life table was constructed from following individuals who were diagnosed with a slow-progressing form of prostate cancer and decided not to receive treatment of any form. Calculate the survival probability at year 1 using the Kaplan-Meir approach and interpret the results.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Time in Years** | **Number at Risk, Nt** | **Number of Deaths, Dt** | **Number Censored, Ct** | **Survival Probability** |
| **0** | **20** |  |  | **1** |
| **1** | **20** | **3** |  |  |
| **2** | **17** |  | **1** |  |
| **3** | **16** | **2** | **1** |  |

1. The probability of surviving 1 year after being diagnosed with a slow-progressing form of prostate cancer is .85.
2. The probability of surviving 1 year after being diagnosed with a slow-progressing form of prostate cancer is .85 for the individuals being followed in this study.
3. The probability of surviving 1 year after being diagnosed with a slow-progressing form of prostate cancer is .85 for individuals who decided against all forms of treatment.
4. The probability of surviving 1 year after being diagnosed with a slow-progressing form of prostate cancer is .85 for the individuals being followed in this study and for individuals who decided against all forms of treatment.

5. Assume the below life table was constructed from following individuals who were diagnosed with a slow-progressing form of prostate cancer and decided not to receive treatment of any form. Calculate the survival probability at year 2 using the Kaplan-Meir approach and interpret the results.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Time in Years** | **Number at Risk, Nt** | **Number of Deaths, Dt** | **Number Censored, Ct** | **Survival Probability** |
| **0** | **20** |  |  | **1** |
| **1** | **20** | **3** |  |  |
| **2** | **17** |  | **1** |  |
| **3** | **16** | **2** | **1** |  |

1. The probability of surviving 2 years after being diagnosed with a slow-progressing form of prostate cancer is .85.
2. The probability of surviving 2 years after being diagnosed with a slow-progressing form of prostate cancer is .85 for the individuals being followed in this study.
3. The probability of surviving 2 years after being diagnosed with a slow-progressing form of prostate cancer is .85 for individuals who decided against all forms of treatment.
4. The probability of surviving 2 years after being diagnosed with a slow-progressing form of prostate cancer is .85 for the individuals being followed in this study and for individuals who decided against all forms of treatment.

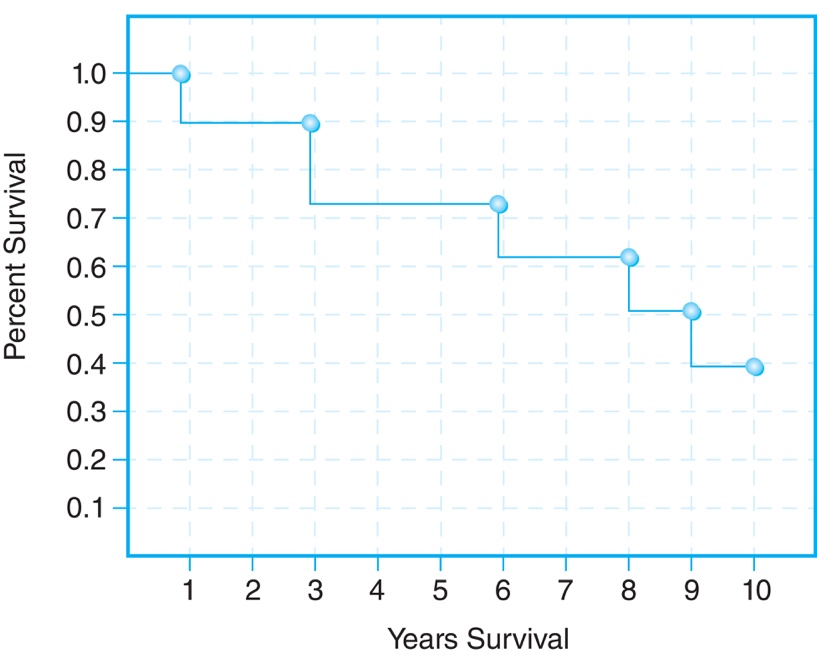
**True/False**

6. True or False? Assume the below life table was constructed from following individuals who were diagnosed with slow-progressing form of prostate cancer and decided not to receive treatment of any form. The calculated survival probability for year 3, if the Kaplan-Meir approach is used to calculate the survival probability, is approximately 0.85.

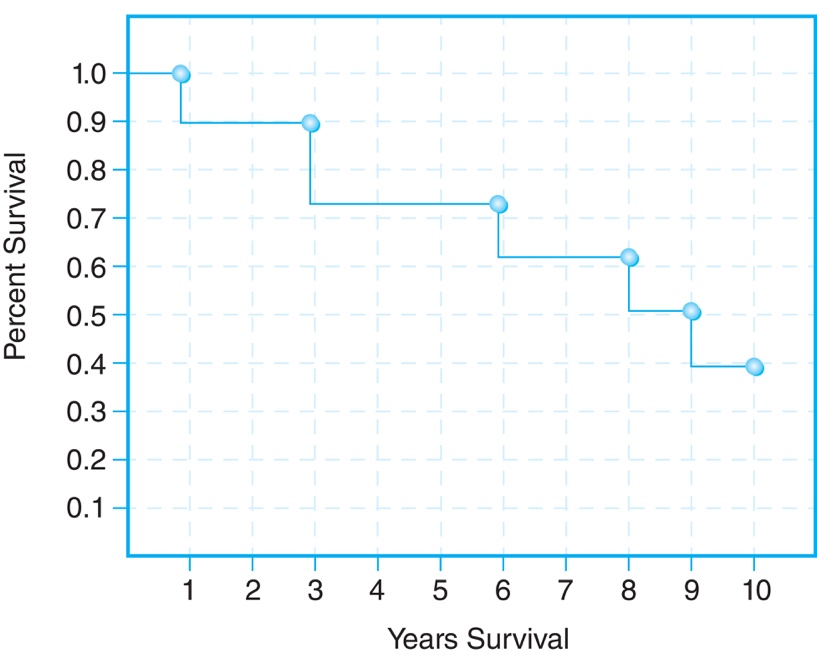
|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Time in Years** | **Number at Risk, Nt** | **Number of Deaths, Dt** | **Number Censored, Ct** | **Survival Probability** |
| **0** | **20** |  |  | **1** |
| **1** | **20** | **3** |  |  |
| **2** | **17** |  | **1** |  |
| **3** | **16** | **2** | **1** |  |

7. True or False? Greenwood’s formula allows one to calculate the standard error of the survival estimates for a particular study.

8. True or False? According to the survival curve below, at 2 years of time the probability of survival is approximately 90%.



9. True or False? According to the survival curve below, the probability of survival at 8 years of time is approximately 50%.



10. True or False? One of the most popular regression techniques for survival analysis is Cox proportional hazards regression. Cox proportional hazards regression is used to relate several risk factors or exposures, considered simultaneously, to survival time.

**Chapter 12**

**Multiple Choice**

1. Which graphic representation could a researcher use to help determine if a continuous variable followed a normal distribution?

1. Bar chart
2. Pie chart
3. Box and Whisker Plot
4. Histogram and Box plot

2. Which graphic representation are appropriate when we wish to illustrate complex relationships among variables that cannot be shown with tables or text, or to show trends or geographic variations?

1. Bubble maps
2. Charts
3. Stem plots
4. Figures

3. A Column spanner in a table should describe which of the following?

1. The independent variable
2. The dependent variable
3. The covariate variable
4. The grouping variable

4. Which graph would be most useful in determining the change in two variables over time?

1. A line chart
2. A histogram
3. A bar chart
4. A flow chart

5. Which type of statistical information or graph would be most helpful in determining whether the baseline characteristics of a study group are well balanced?

1. A bar chart
2. A box-whisker plot
3. Descriptive statistic
4. A flow chart

**True/False**

6. True or False? Using a 95% confidence interval to describe an odds ratio allows other researchers to determine if the results were statistically significant because a statistically significant odds ratio confidence interval will include the number 1.

7. True or False? The *r*2 value and a least squares regression line can be an excellent way to demonstrate the degree of correlation between two variables, and the type of association between the two variables.

8. True or False? Box-whisker plots are useful tools in comparing the median and the distribution of two or more variables broken down into different categories.

9. True or False? Variable names and units of measurement should not be specified clearly and accurately.

10. True or False? Good tables have clear and concise titles.