## Instructions

Please complete the following lab assignment. You may work on the assignment in groups or on your own. However, to get credit, you must submit your own answers in Canvas. This lab is open note and open book. You may also ask the instructor and the TA questions. Please note that in most cases we will try to guide you towards answering your own question rather than directly providing you with an answer.

**Calculations**

**Q1: Statistical Significance**

[Multiple Choice]

Which of the following is used to determine if there is a statistically significant difference between the survivals of the exposed and unexposed groups when there are censored observations?

|  |  |
| --- | --- |
|  | The T-Box Test |
| ✅ | The Log-Rank Test |
|  | Logistic regression |
|  | Linear Regression |

**Q1: Feedback**

The correct answer choice is the log-rank test is used to test for a statistical difference in the mean of the survival of exposure groups when there are censored observations. Linear and Logistic regression do not account for censored observations.

Please make sure you understand why this is the correct answer. You may use the "Previous" button below to update your answer if your original answer was incorrect.

Click the "Next" button below to move on to the next question.

**Q2:** **Kaplan-Meier**

[True/False]

If the Kaplan-Meier curves of the two groups being compared are parallel, it means the proportional hazard assumption has been violated.

|  |  |
| --- | --- |
|  | True |
| ✅ | False |

**Q2: Feedback**

This is false. If the Kaplan-Meier curves of the two groups being compared are parallel (i.e. do not cross), it's an indication that the PH assumption has not been violated. This can also be determined quantitatively using other tests like the 'Schoenfeld residual test for the evaluation of PH assumption'.

Please make sure you understand why this is the correct answer. You may use the "Previous" button below to update your answer if your original answer was incorrect.

Click the "Next" button below to move on to the next question.

**Q3: Cox Model**

[Multiple Answers]

Which of the following are the advantages of using the Cox-model? Choose all that apply

|  |  |
| --- | --- |
| ✅ | It is non-parametric as it does not require selection of a particular probability distribution to represent survival times |
| ✅ | It can incorporate time-dependent variables if needed by modifying the variables |
| ✅ | Multiple predictors (both categorical and continuous variables) can be included in the model |
| ✅ | Includes more information as it accounts for censored individuals |

**Q3: Feedback**

All the answer choices are correct. The Cox proportional hazard is nonparametric (does not require certain distribution assumptions). It can incorporate multiple categorical and continuous variables unlike Kaplan-Meier analysis. With time dependent variables, interaction variables of the exposure and time can be created and added to the cox model. It also accounts for censoring in the analysis.

Please make sure you understand why this is the correct answer. You may use the "Previous" button below to update your answer if your original answer was incorrect.

Click the "Next" button below to move on to the next question.

**Q4:** **Assumptions of** **Survival Analysis**

[Multiple Answers]

Which of the following assumptions must be met when conducting survival analysis? Choose all that apply.

|  |  |
| --- | --- |
| ✅ | Lack of secular changes that could significantly affect the measure of relevant exposures and outcome |
| ✅ | Censored individuals have the same probability of the event or outcome as those that remain in the study |
| ✅ | There is uniformity of losses and events within each interval of the study if intervals are used |
|  | All participants contribute the same amount of time to the study |

**Q4: Feedback**

The correct answer choices are:

* Lack of secular changes that could significantly affect the measure of relevant exposures and outcome
* Censored individuals have the same probability of the event or outcome as those that remain in the study
* There is uniformity of losses and events within each interval of the study if intervals are used

In survival analysis, all participants are NOT required to contribute the same amount of time. Subjects are free to withdraw from the study. Some are lost to follow up. Whatever time they contributed will be included in the analysis.

Please make sure you understand why this is the correct answer. You may use the "Previous" button below to update your answer if your original answer was incorrect.

Click the "Next" button below to move on to the next question.

**Q5:** **Definition of** **Hazard**

[True/False]

Hazard is defined as the cumulative rate of disease occurrence among those who survive to the end of the study

|  |  |
| --- | --- |
|  | True |
| ✅ | False |

**Q5: Feedback**

This is false. Hazard is the instantaneous rate of disease occurrence among those who have survived up to a particular time (t). It is also referred to as the instantaneous force of morbidity or mortality given that the patient has survived (i.e. not experienced the event of interest) up to a particular time.

Please make sure you understand why this is the correct answer. You may use the "Previous" button below to update your answer if your original answer was incorrect.

Click the "Next" button below to move on to the next question.

**Q6:** **Interpret Log-rank**

[Multiple Choice]

A group of researchers examined for the risk of stroke based on exposure to antihypertensive medications [bpmeds YES (1) or NO (0)] among a cohort of patients after follow up. They generated a Kaplan-Meier curve and conducted a log-rank test using the STATA software. They evaluated for the Proportional Hazard assumption. They also carried out a cox-regression analysis adjusting for the baseline BMI (kg/m2) of the patients when they were recruited. The STATA output for the Log-rank test is shown below.

**Table

Description automatically generated**

What should be their conclusion based on this output?

|  |  |
| --- | --- |
|  | There is no statistically significant difference in the survival function (curve) between those exposed to antihypertensive medications and those not exposed |
| ✅ | There is a statistically significant difference in the survival function (curve) between those exposed to antihypertensive medications and those not exposed |
|  | There may or may not be a statistically significant difference in the survival function (curve) between those exposed to antihypertensive medications and those not exposed |
|  | None of the above |

**Q6: Feedback**

The correct answer choice is: There is a statistically significant difference in the survival function (curve) between those exposed to antihypertensive medications and those not exposed.

The null hypothesis of the log-rank test is that there is no statistically significant difference between the survival curves. Since the P-value is less than 0.05, we reject the null. This means that there is a statistically significant difference between the survivor functions of the two groups.

Please make sure you understand why this is the correct answer. You may use the "Previous" button below to update your answer if your original answer was incorrect.

Click the "Next" button below to move on to the next question.

**Q7: Interpret Cox Regression**

[Multiple Choice]

A group of researchers examined for the risk of stroke based on exposure to anti-hypertensive medications [bpmeds YES (1) or NO (0)] among a cohort of patients after follow up. They generated a Kaplan-Meier curve and conducted a log-rank test using the STATA software. They evaluated for the Proportional Hazard assumption.  They also carried out a cox-regression analysis adjusting for the baseline BMI (kg/m2) of the patients when they were recruited. The STATA output for the cox regression is shown below

![Table

Description automatically generated]()Which of the following is a correct interpretation of the effect estimate for anti-hypertensive medications (bpmeds)?

|  |  |
| --- | --- |
|  | The hazard of stroke for people who take anti-hypertensive medications is increased by 4.07 units (95% CI: 2.85 – 5.83) in comparison to that of people who do not take anti-hypertensive medications, adjusting for bmi. |
|  | The hazard of stroke for people who take anti-hypertensive medications is reduced by 4.07 units (95% CI: 2.85 – 5.83) in comparison to that of people who do not take anti-hypertensive medications, adjusting for bmi. |
| ✅ | The hazard of stroke for people who take anti-hypertensive medications is 4.08 (95% CI: 2.85 – 5.83) times that of people who do not take anti-hypertensive medications, adjusting for bmi. |
|  | The hazard of stroke for people who take anti-hypertensive medications is 407% (95% CI: 2.85 – 5.83) higher than that of people who do not take anti-hypertensive medications, adjusting for bmi. |

**Q7: Feedback**

The correct answer choice is: The hazard of stroke for people who take anti-hypertensive medications is 4.08 (95% CI: 2.85 – 5.83) times that of people who do not take anti-hypertensive medications, adjusting for BMI.

Please make sure you understand why this is the correct answer. You may use the "Previous" button below to update your answer if your original answer was incorrect.

Click the "Next" button below to move on to the next question.

**Q8: Interpret Cox Regression**

[Multiple Choice]

A group of researchers examined for the risk of stroke based on exposure to anti-hypertensive medications [bpmeds YES (1) or NO (0)] among a cohort of patients after follow up. They generated a Kaplan-Meier curve and conducted a log-rank test using the STATA software. They evaluated for the Proportional Hazard assumption.  They also carried out a cox-regression analysis adjusting for the baseline BMI (kg/m2) of the patients when they were recruited. The STATA output for the cox regression is shown below

![Table

Description automatically generated]()

Which of the following is a correct interpretation of the effect estimate for bmi?

|  |  |
| --- | --- |
| ✅ | The hazard of stroke increases by 6 % (95% CI: 1.04 – 1.08) for every unit increase in bmi (Kg/m2), adjusting for anti-hypertensive medications. |
|  | The hazard of stroke increases by 106 % (95% CI: 1.04 – 1.08) for every unit increase in bmi (Kg/m2), adjusting for anti-hypertensive medications. |
|  | The hazard of stroke reduces by 6 % (95% CI: 1.04 – 1.08) for every unit increase in bmi (Kg/m2), adjusting for anti-hypertensive medications. |
|  | The hazard of stroke reduces by 106 % (95% CI: 1.04 – 1.08) for every unit increase in bmi (Kg/m2), adjusting for anti-hypertensive medications. |

**Q8: Feedback**

The correct answer choice is: The hazard of stroke increases by 6 % (95% CI: 1.04 – 1.08) for every unit increase in BMI (Kg/m2), adjusting for anti-hypertensive medications.

We can also say the hazard of stroke increases 1.06 times for every unit increase in BMI.

Please make sure you understand why this is the correct answer. You may use the "Previous" button below to update your answer if your original answer was incorrect.

Click the "Next" button below to move on to the next question.

**Q9: Cox Equation**

[Multiple Choice]

A group of researchers investigated the effect that time-independent variables (gender, ethnicity) and time dependent variables (serum cholesterol, mg/dl and bmi, kg/m2) will have on stroke outcome using cox proportional hazard model. They properly accounted for the time-independent and time-dependent nature of the variables in their model. Write the Cox proportional hazard equation that describes this relationship. (Note, the 't' in the answer choices represent time).

|  |  |
| --- | --- |
|  | Hazard of Stroke (t) = h0 (t) \* (β1\*Gender + β2\*Ethnicity + β3\*Serum Cholesterol\*t + β4\*BMI\*t ) |
|  | Hazard of Stroke (t) = h0 (t) \* exp (β1\*Gender\*t + β2\*Ethnicity\*t + β3\*Serum Cholesterol\*t + β4\*BMI\*t ) |
| ✅ | Hazard of Stroke (t) = h0 (t) \* exp (β1\*Gender + β2\*Ethnicity + β3\*Serum Cholesterol\*t + β4\*BMI\*t) |
|  | Hazard of Stroke (t)=h0 (t) \* exp (β1\*Gender\*t + β2\*Ethnicity\*t + β3\*Serum Cholesterol + β4\*BMI) |
|  | Hazard of Stroke (t)=h0 (t) + β1⁡\*Gender + β2\*Ethnicity + β3\*Serum Cholesterol\*t + β4\*BMI\*t |

**Q9: Feedback**

The correct answer choice is Hazard of Stroke (t) = h0 (t) \* exp (β1\*Gender + β2\*Ethnicity + β3\*Serum Cholesterol\*t + β4\*BMI\*t ). Since serum cholesterol and BMI are time-dependent (i.e. varies with time), this has to be accounted for in the model by creating an 'exposure x time' interaction variable. The interaction variable is included in the model. Gender and ethnicity are not time-dependent here. So, an interaction variable is not created for them.

Please make sure you understand why this is the correct answer. You may use the "Previous" button below to update your answer if your original answer was incorrect.

Click the "Next" button below to move on to the next question.

**Q10:** **KM Survival Table**

[Multiple Choice]

Complete the following Kaplan-Meier Survival table.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Time (years) | No. of Individuals at Risk | No. of Events | Conditional Probability of Event | Conditional Probability of Survival | Cumulative Probability of Survival |
| 1 | 40 | 2 |  |  |  |
| 4 | 35 | 2 |  |  |  |
| 7 | 30 | 3 |  |  |  |
| 12 | 25 | 4 |  |  |  |
| 18 | 20 | 2 |  |  |  |
| 25 | 15 | 5 |  |  |  |

How many people were lost to follow up cumulatively by the 25th year of the study?

|  |  |
| --- | --- |
|  | 3 |
|  | 10 |
| ✅ | 12 |
|  | 15 |

**Q10: Feedback**

The correct answer is 12.

At the start of year 1, there were 40 people. At the start of year 4, there were 35 people. That is a difference of 5 people. However, we can see in the table that only 2 of those people had an event. That means that 5 - 2 = 3 of those people must have been lost to follow-up. Using similar logic, we can calculate the cumulative number lost to follow-up by the 25th year like this:

Between 1 and 4 = 40 - 35 = 5 - 2 = 3

Between 4 and 7 = 35 - 30 = 5 - 2 = 3

Between 7 and 12 = 30 - 25 = 5 - 3 = 2

Between 12 and 18 = 25 - 20 = 5 - 4 = 1

Between 18 and 25 = 20 - 15 = 5 - 2 = 3

3 + 3 + 2 + 1 + 3 = 12

Please make sure you understand why this is the correct answer. You may use the "Previous" button below to update your answer if your original answer was incorrect.

Click the "Next" button below to move on to the next question.

**Q11:** **KM Survival Table**

[Multiple Choice]

Complete the following Kaplan-Meier Survival table.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Time (years) | No. of Individuals at Risk | No. of Events | Conditional Probability of Event | Conditional Probability of Survival | Cumulative Probability of Survival |
| 1 | 40 | 2 |  |  |  |
| 4 | 35 | 2 |  |  |  |
| 7 | 30 | 3 |  |  |  |
| 12 | 25 | 4 |  |  |  |
| 18 | 20 | 2 |  |  |  |
| 25 | 15 | 5 |  |  |  |

What is the conditional probability of the event by the 7th year?

|  |  |
| --- | --- |
| ✅ | 0.1000 |
|  | 0.9000 |
|  | 0.1600 |
|  | 0.3333 |

**Q11: Feedback**

The correct answer is 0.1000.

3 / 30 = 0.100

Please make sure you understand why this is the correct answer. You may use the "Previous" button below to update your answer if your original answer was incorrect.

Click the "Next" button below to move on to the next question.

**Q12:** **KM Survival Table**

[Multiple Choice]

Complete the following Kaplan-Meier Survival table.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Time (years) | No. of Individuals at Risk | No. of Events | Conditional Probability of Event | Conditional Probability of Survival | Cumulative Probability of Survival |
| 1 | 40 | 2 |  |  |  |
| 4 | 35 | 2 |  |  |  |
| 7 | 30 | 3 |  |  |  |
| 12 | 25 | 4 |  |  |  |
| 18 | 20 | 2 |  |  |  |
| 25 | 15 | 5 |  |  |  |

What is the conditional probability of survival by the 12th year?

|  |  |
| --- | --- |
|  | 0.1000 |
|  | 0.9000 |
| ✅ | 0.8400 |
|  | 0.6667 |

**Q12: Feedback**

The correct answer choice is 0.8400.

The conditional probability of event = 4 / 25 = 0.16

The conditional probability of survival = 1 - the conditional probability of event

The conditional probability of survival = 1 - 0.16

The conditional probability of survival = 0.8400

Please make sure you understand why this is the correct answer. You may use the "Previous" button below to update your answer if your original answer was incorrect.

Click the "Next" button below to move on to the next question.

**Q13:** **KM Survival Table**

[Multiple Choice]

Complete the following Kaplan-Meier Survival table.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Time (years) | No. of Individuals at Risk | No. of Events | Conditional Probability of Event | Conditional Probability of Survival | Cumulative Probability of Survival |
| 1 | 40 | 2 |  |  |  |
| 4 | 35 | 2 |  |  |  |
| 7 | 30 | 3 |  |  |  |
| 12 | 25 | 4 |  |  |  |
| 18 | 20 | 2 |  |  |  |
| 25 | 15 | 5 |  |  |  |

What is the cumulative probability of survival by the 18th year?

|  |  |
| --- | --- |
|  | 0.9500 |
| ✅ | 0.6094 |
|  | 0.4064 |
|  | 0.8062 |

**Q13: Feedback**

The correct answer choice is 0.6094

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Time (years) | No. of Individuals at Risk | No. of Events | Conditional Probability of Event | Conditional Probability of Survival | Cumulative Probability of Survival |
| 1 | 40 | 2 | 0.050 | 0.950 | 0.9500 |
| 4 | 35 | 2 | 0.057 | 0.943 | 0.8957 |
| 7 | 30 | 3 | 0.100 | 0.900 | 0.8061 |
| 12 | 25 | 4 | 0.160 | 0.840 | 0.6772 |
| 18 | 20 | 2 | 0.100 | 0.900 | 0.6094 |
| 25 | 15 | 5 | 0.333 | 0.667 | 0.4063 |

Please make sure you understand why this is the correct answer. You may use the "Previous" button below to update your answer if your original answer was incorrect.

Click the "Next" button below to move on to the next question.

**Q14:** **KM Survival Table**

[Multiple Choice]

Using the following Kaplan-Meier Survival table, what is the cumulative probability of the event by the end of the study?

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Time (years) | No. of Individuals at Risk | No. of Events | Conditional Probability of Event | Conditional Probability of Survival | Cumulative Probability of Survival |
| 1 | 40 | 2 | 0.050 | 0.950 | 0.9500 |
| 4 | 35 | 2 | 0.057 | 0.943 | 0.8957 |
| 7 | 30 | 3 | 0.100 | 0.900 | 0.8061 |
| 12 | 25 | 4 | 0.160 | 0.840 | 0.6772 |
| 18 | 20 | 2 | 0.100 | 0.900 | 0.6094 |
| 25 | 15 | 5 | 0.333 | 0.667 | 0.4063 |

|  |  |
| --- | --- |
| ✅ | 0.5937 |
|  | 0.4064 |
|  | 0.3333 |
|  | 0.6667 |

**Q14: Feedback**

The correct answer choice is 0.5937. The completed table is shown below

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Time (years) | No. of Individuals at Risk | No. of Events | Conditional Probability of Event | Conditional Probability of Survival | Cumulative Probability of Survival |
| 1 | 40 | 2 | 0.050 | 0.950 | 0.9500 |
| 4 | 35 | 2 | 0.057 | 0.943 | 0.8957 |
| 7 | 30 | 3 | 0.100 | 0.900 | 0.8061 |
| 12 | 25 | 4 | 0.160 | 0.840 | 0.6772 |
| 18 | 20 | 2 | 0.100 | 0.900 | 0.6094 |
| 25 | 15 | 5 | 0.333 | 0.667 | 0.4063 |

Cumulative probability of event = 1 - the cumulative probability of survival.

1 - 0.4063 = 0.5937

Please make sure you understand why this is the correct answer. You may use the "Previous" button below to update your answer if your original answer was incorrect.

Click the "Next" button below to move on to the next question.

**Q15. Interpret Cox Regression**

[Multiple Choice]

**Cox regression analysis**was performed to determine whether the history of IV drug use was associated with the time to an event. The results of the analysis are shown below:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | beta | SE | Wald statistic | df | Sig |
| Age  (years) | 0.092 | 0.018 | 24.512 | 1 | <0.0001 |
| History of IV drug use (No vs. yes) | 0.941 | 0.256 | 13.574 | 1 | <0.0001 |

The team wanted to test whether there was any difference in the length of time to an event between patients with (yes) and without (no) a history of IV drug use. Which of the following is the proper null hypothesis to test this question?

|  |  |
| --- | --- |
| ✅ | H0: beta (History of IV drug use) is equal to 0, after controlling for age in the model. |
|  | H0: beta (History of IV drug use) is equal to 0 |
|  | H0: beta (History of IV drug use) is not equal to 0 |
|  | H0: beta (History of IV drug use) is not equal to 0 after controlling for age in the model |

**Q15: Feedback**

The correct answer is: beta (History of IV drug use) is equal to 0, after controlling for age in the model.

Please make sure you understand why this is the correct answer. You may use the "Previous" button below to update your answer if your original answer was incorrect.

Click the "Next" button below to move on to the next question.

**Q16. Interpret KM from Stata**

[Multiple Choice]

Median survival rate and Kaplan-Meier (survival) curve for the overall survival during the follow-up months was depicted below.

Based on the KM (survival) curve, an estimate of the median survival time is:

![Table

Description automatically generated]()

![Chart, histogram

Description automatically generated]()

|  |  |
| --- | --- |
|  | 11.3 months |
|  | 4.8 months |
| ✅ | 7 months |
|  | 14 months |

**Q16: Feedback**

The correct answer is 7 months. The right half of the table above includes information about the median estimated survival time. The value of the estimated median survival time is 7 and the unit of time used in this data is months.

Please make sure you understand why this is the correct answer. You may use the "Previous" button below to update your answer if your original answer was incorrect.

Click the "Next" button below to move on to the next question.

**Q17. Log-rank Test**

[Multiple Choice]

A research team was interested in examining differences in the first occurrence of any cardiovascular disease (CVD) event between people with varying exercise habits in a prospective cohort that followed participants for 6 years.

All participants were former college athletes (mean age 35 years) at the time of enrollment. Participants who reported engaging in regular exercise are labeled as exercise program A below and are considered to be the unexposed group. Participants who reported engaging in irregular exercise are labeled as exercise program B below and are considered to be the exposed group.

![Chart

Description automatically generated]()

![Table

Description automatically generated]()

Which of the following statements is the most appropriate to describe the results from the Kaplan-Meier curves and the log-rank test provided above?

|  |  |
| --- | --- |
| ✅ | The survival functions for participants in the exercise A group is different from that for subjects in the exercise B group at some point in time. |
|  | The survival functions for participants in the exercise A group is different from that for subjects in the exercise B group for all points in time. |
|  | The survival functions for participants in the exercise A group is the same as that for subjects in the exercise B group at some point in time. |
|  | The survival functions for participants in the exercise A group is the same as that for subjects in the exercise B group for all points in time. |

**Q17: Feedback**

The null hypothesis for this test is that the survival distributions being compared are equal at all follow-up ﻿times. Therefore, the alternative hypothesis would be that there is a difference in the survival distributions at some point during the follow-up times. Therefore, the correct answer is that the survival functions for subjects in the exercise A group is different from that for participants in the exercise B group at some point in time.

Please make sure you understand why this is the correct answer. You may use the "Previous" button below to update your answer if your original answer was incorrect.

Click the "Next" button below to move on to the next question.

**Q18. Most Appropriate Regression**

[Multiple Choice]

A research team was interested in examining differences in the first occurrence of any cardiovascular disease (CVD) event between people with varying exercise habits in a prospective cohort that followed participants for 6 years.

All participants were former college athletes (mean age 35 years) at the time of enrollment. Participants who reported engaging in regular exercise are labeled as exercise program A below and are considered to be the unexposed group. Participants who reported engaging in irregular exercise are labeled as exercise program B below and are considered to be the exposed group.

Suppose that this research team wanted to include baseline BMI (body mass index, kg/m2, a continuous variable) as a confounder in the analysis. What would be the most appropriate statistical analysis?

|  |  |
| --- | --- |
|  | Log-rank test using Kaplan-Meier survival curves |
|  | Multiple linear regression |
| ✅ | Proportional-hazards (Cox) regression |
|  | Multiple logistic regression |

**Q18: Feedback**

The correct answer is proportional-hazards (Cox) regression. The log-rank test using Kaplan-Meier survival curves allows you to test for a difference in survival curves for a single exposure. Here we want our results to be adjusted for BMI. Linear and logistic regression are not used for survival analysis.

Please make sure you understand why this is the correct answer. You may use the "Previous" button below to update your answer if your original answer was incorrect.

Click the "Next" button below to move on to the next question.

**Q19. Interpret Cox Regression**

[Multiple Choice]

A research team was interested in examining differences in the first occurrence of any cardiovascular disease (CVD) event between people with varying exercise habits in a prospective cohort that followed participants for 6 years.

All participants were former college athletes (mean age 35 years) at the time of enrollment. Participants who reported engaging in regular exercise are labeled as exercise program A below and are considered to be the unexposed group. Participants who reported engaging in irregular exercise are labeled as exercise program B below and are considered to be the exposed group.

This research team wanted to include baseline BMI (body mass index, kg/m2, a continuous variable) as a confounder in the analysis.

Below are the results of the analysis they conducted to determine whether exercise habits are related to the time of the first CVD event. Which statement would be **the most appropriate** interpretation of the effect estimate for exercise habits?

![Table

Description automatically generated]()

|  |  |
| --- | --- |
|  | The hazard of having the first CVD in the exercise B group is about 1.06 times the hazard (risk) of having first CVD in the exercise A group. |
|  | The hazard of having the first CVD event increases by 6% as the exercise habits increases by 1 unit, while adjusting for BMI in the model. |
|  | The hazard of having the first CVD in the exercise B group is about 0.392 times the hazard (risk) of having first CVD in the exercise A group. |
| ✅ | The hazard of having the first CVD in the exercise B group is about 1.48 times the hazard (risk) of having first CVD in the exercise A group, while adjusting for BMI in the model. |

**Q19: Feedback**

The hazard of having the first CVD in the exercise B group is about 1.48 times the hazard (risk) of having first CVD in the exercise A group, while adjusting for BMI in the model.

Please make sure you understand why this is the correct answer. You may use the "Previous" button below to update your answer if your original answer was incorrect.

Click the "Next" button below to move on to the next question.

**Q20. Interpret Cox Regression**

[Multiple Choice]

A research team was interested in examining differences in the first occurrence of any cardiovascular disease (CVD) event between people with varying exercise habits in a prospective cohort that followed participants for 6 years.

All participants were former college athletes (mean age 35 years) at the time of enrollment. Participants who reported engaging in regular exercise are labeled as exercise program A below and are considered to be the unexposed group. Participants who reported engaging in irregular exercise are labeled as exercise program B below and are considered to be the exposed group.

This research team wanted to include baseline BMI (body mass index, kg/m2, a continuous variable) as a confounder in the analysis.

Below are the results of the analysis they conducted to determine whether exercise habits are related to the time of the first CVD event. Which statement would be **the most appropriate** interpretation of the effect estimate for BMI?

![Table

Description automatically generated]()

According to the information in Question 19, Interpret the effect estimate for BMI?

|  |  |
| --- | --- |
| ✅ | The hazard of having the first CVD increases by 6.1% ( 95% CI 1.036-1.088) for every unit increase in BMI adjusting for exercise habits. |
|  | The hazard of having the first CVD decreases by 6.1% ( 95% CI 1.036-1.088) for every unit increase in BMI adjusting for exercise habits. |
|  | The hazard of having the first CVD increases by 6.1% ( 95% CI 1.036-1.088) for every unit increase in BMI. |
|  | None of the above |

**Q20: Feedback**

The correct answer is: The hazard of having the first CVD increase by 6.1% (95% CI = 1.036 - 1.088) for every unit increase in BMI adjusting for exercise habits.

Please make sure you understand why this is the correct answer. You may use the "Previous" button below to update your answer if your original answer was incorrect.

Click the "Next" button below to move on to the next question.

**Q21:** **Optional Feedback**

**Optional**: Please feel free to leave any comments below about the usefulness of this lab. Which parts were helpful? What could I do to improve it? What is still unclear?