Quiz 10

1. (Short answer) Which of the following is **not** a characteristic of the Kaplan-Meier estimator of a survival function?
2. The Kaplan-Meier estimator is non-increasing over time.
3. The Kaplan-Meier estimator changes ("jumps") at all observed times (events and censoring).
4. The Kaplan-Meier estimator is nonparametric.
5. The Kaplan-Meier estimator always equals 1 before the first observed event time.
6. (True/False) If more than half the individuals in a survival dataset experience an event (i.e., are not censored), then the median survival time can always be estimated.
7. (Short answer) Taylor is performing a psychology study on self-control. She enrolls children between three and five years of age into her study, places a marshmallow in front of each child, and instructs them not to eat the marshmallow. She measures the time from when the marshmallow is placed in front of the child until the child eats the marshmallow.

Taylor hypothesizes that older children have more self-control than younger children, and will wait longer before eating the marshmallow. She dichotomizes age into "under 4 years old" and "over 4 years old" and performs a log-rank test comparing the younger and older children.

What are the hypotheses of Taylor's log-rank test? Use language specific to the context of this problem.

1. (Short answer) Charlie is studying the distribution of time from hospitalization until death in patients with sepsis (blood infection). He is interested in whether a new antibiotic can improve patient survival times. Laboratory results indicate that the antibiotic is highly effective early in treatment, but eventually the bacteria can develop resistance and continue to proliferate.

Using this knowledge, do you believe that the proportional hazards assumption holds in this scenario? Explain your rationale.

1. (True/False) The hazard ratio is bounded between 0 and 1.
2. (Multiple response) Which of the following is true of the log-rank test? Select all that apply.

* The log-rank test relies on the assumption of independent censoring.
* The log-rank test allows us to estimate the association between some predictor of interest and survival time.
* The log-rank test is limited to comparisons of two groups of individuals.
* The log-rank test relies on the assumption of proportional hazards.

1. (True/False) Confounding variables are handled identically in linear, logistic, and Cox proportional hazards regression.
2. (Multiple choice) In which of the following study designs could the outcome **not**be subject to right-censoring?
3. Prospective cohort
4. Retrospective cohort
5. Case-control
6. Randomized controlled trial
7. (Short answer) Taylor is studying her cat's sleeping habits. Every day, she measures how many hours the cat sleeps. To save space in her data log, Taylor only records the time to the nearest whole hour (e.g., 6.5 hours is recorded as 7 hours).

Which variable type best describes the resulting data? Give one sentence explaining your rationale.

1. (True/False) If the alternative hypothesis is true, the observed p-value will always be less than 0.05.