1. Consider a multiple linear regression with 20 predictor variables. Let $\alpha = 0.05$. The probability of a type I error for any single predictor is 0.05. — 3 / 3 points

True

False

2. Consider a multiple linear regression with 20 predictor variables. Let $\alpha = 0.05$. The probability of a type I error for at least one of the predictors is 0.05. — 3 / 3 points

True

False

3. Researchers studied the bedtime habits of 200 individuals. Among them, 100 individuals read for at least 30 minutes before bed, and 100 did not. Over 20 variables were measured on these individuals, including their sleep duration, quality, blood pressure, blood sugar levels, anxiety and depression levels, etc. — 3 / 3 points

Let $\alpha = 0.05$. It is more likely than not that researchers will observe a false positive.

True

False

4. The F-distribution is a special case of the Gamma distribution. — 3 / 3 points

True

False

5. Under the standard regression assumptions, the partial F-test tests the null hypothesis that $E(Y) = \beta_0$. — 3 / 3 points

True

False

6. Under the standard regression assumptions, the mean of a response $\hat{y}_i^* = \mathbf{x}^*\widehat{\boldsymbol{\beta}}$ at a new set of predictors $\mathbf{x}^* = (1, x_1^*, ..., x_p^*)$ is $\sqrt{\sigma^2 \mathbf{x}^* \left(X^T X\right)^{-1} \mathbf{x}^{*T}}$. — 3 / 3 points

True

False

7. Consider a well-fitting simple linear regression model in R. The predict() function produces the following output (at the default $\alpha = 0.05$): — 4 / 4 points

fit	lwr	upr
1.32209	-0.1830998	2.82728

There is statistical evidence that the mean response at the new value of x is different from zero.

There is no statistical evidence that the mean response at the new value of x is different from zero.

The best point estimate for the mean response at the new value of x is any value between -0.1830998 and 2.82728.

The best point estimate for the mean response at the new value of x is 1.32209.

8. Researchers and government officials in Boulder, Colorado are studying the impact of universal basic income (UBI) on the personal savings of city residents. The researchers hypothesize that providing all city residents of Boulder with $\$1,000$ per month will lead to a "significant increase" in personal savings. Data were collected that were relevant to this hypothesis, and a regression was performed. — 4 / 4 points

The regression parameter associated with the UBI payment was estimated to be $\widehat{\beta}_{UBI} = \$1$, and was (correctly) interpreted as follows: controlling for other variables in the regression (e.g., demographic information, initial wealth), city residents who received the UBI payments saved $\$1$ more per year, on average, than those who did not receive the payments.

The associated confidence interval for $\tilde{\beta}_{UBI}$ is given as $(-\$10, \$15)$. Which of the following statements is correct?

There is no statistical evidence that, when controlling for other variables in the regression, UBI payments ncrease mean personal savings.

The best point estimate for the mean personal savings held by a city resident is $\$1$.

There is statistical evidence that, when controlling for other variables in the regression, UBI payments ncrease mean personal savings.

There is not enough information to provide a best point estimate for the mean personal savings held by a city resident.

9. Under the standard linear regression assumptions, identify the expectation of the point estimate for the average response at a new set of predictors, $\mathbf{x}^*$. That is, what is $E(\hat{y}^*)$? — 3 / 3 points

$\mathbf{x}^*\widehat{\boldsymbol{\beta}}$

$\mathbf{x}^*\boldsymbol{\beta}$

$\boldsymbol{\beta}$

$\mathbf{x}^*$