University of Pennsylvania

BIOL4536 Fall 2023

Professor: Gregory R. Grant

QUIZ#1

(Hypothesis Testing / Regression)

September 11th, 2023 Name: _____

Question 1. (2 pts.) p-values control the probability of:
(Circle One)
(A) False Negatives
(B) False Positives
(C) True Negatives
(D) True Positives

Question 2. (1 pt.) If testing for disease X, which of the following is the False Positive Rate?
(A) Prob(test positive $|$ not infected)
(B) Prob(not infected $|$ test positive)

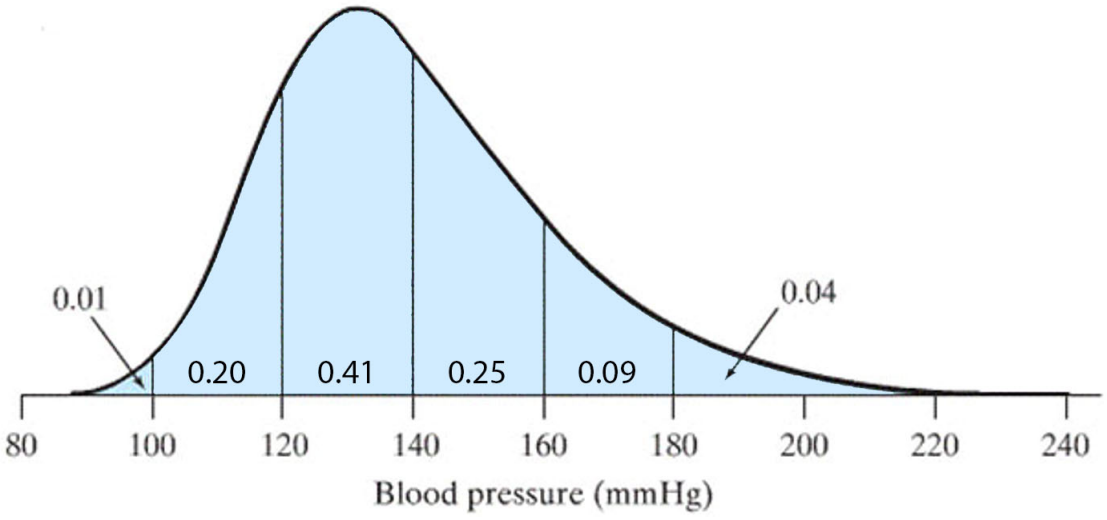
Question 3. (2 pts.) If testing for disease X in a population where nobody is infected, what is the following probability?

$$\text{Prob}(\text{infected} \,|\, \text{test positive})$$

Answer: _____

Question 4. (1 pt.) Suppose you randomly sample a person from a population and measure their blood pressure. Suppose that random quantity is given by the probability density $f(x)$ shown in the figure below (x = blood pressure).
Calculate the following integral and interpret it in words. Specifically, what does it say about the population?

$$\int_{120}^{\infty} f(x)dx$$



Question 5. (1 pt.) True or False. A linear regression model must have a regression curve that is a straight line.

Question 6. (2 pt.) Circle the one correct statement about the regression model $Y = \beta_0 + \beta_1 X + \epsilon$. The word "constant" here means "does not depend on X".

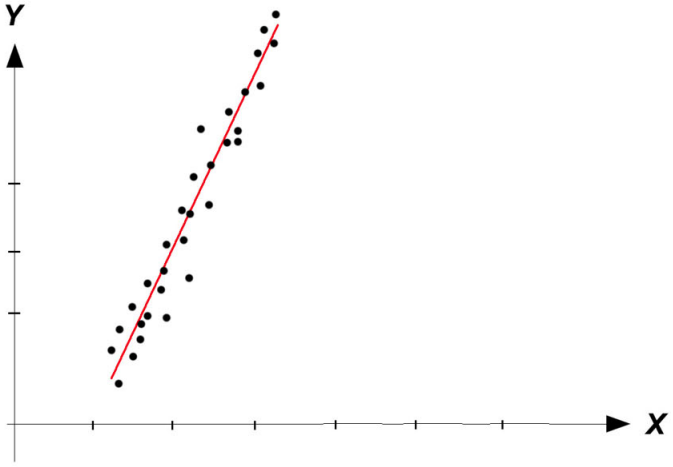
(A) ϵ has constant variance 0

(B) ϵ has constant mean 0

(C) ϵ has constant mean σ

Question 7. (1 pt.) Draw a line from the statement on the left to the relevant graph on the right.

Small σ, large β_1



Large σ, small β_1