

Current Score

QUESTION

1

2

3

4

POINTS

3.5/3.5

2/2

2.5/2.5

7/7



TOTAL SCORE

15/15

100.0%

Due Date

TUE, NOV 28, 2023

11:59 PM GMT+3



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Instructions

Part (e) of Question 3 and part (f) of Question 4 are not required.



Assignment Submission & Scoring

Assignment Submission

For this assignment, you submit answers by questions.

Assignment Scoring

Your best submission for each entire question is used for your score.

1. [3.5/3.5 Points]

DETAILS

ROSBIOSTAT8 5.E.001-005.S.

1/3 Submissions Used

MY NOTES

ASK YOUR TEACHER

Cardiovascular Disease

Because serum cholesterol is related to age and sex, some investigators prefer to express it in terms of z-scores. If X = raw serum cholesterol, then $Z = \frac{X - \mu}{\sigma}$, where μ is the mean and σ is the standard deviation of serum cholesterol for a given age-sex group. Suppose Z is regarded as a standard normal random variable. (Round your answers to four decimal places.)

 USE SALT

(a) What is $Pr(Z < 0.7)$?

✓

(b) What is $Pr(Z > 0.7)$?

✓

(c) What is $Pr(-1.0 < Z < 1.6)$?

✓

Suppose a person is regarded as having high cholesterol if $Z > 2.0$ and borderline cholesterol if $1.5 < Z < 2.0$.

(d) What proportion of people have high cholesterol?

✓

(e) What proportion of people have borderline cholesterol?

✓

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2. [2/2 Points]

DETAILS

ROSBIOSTAT8 5.E.006-009.S.

1/3 Submissions Used

MY NOTES

ASK YOUR TEACHER

Nutrition

Suppose that total carbohydrate intake in 12- to 14-year-old boys is normally distributed, with mean = 121 g/1,000 cal and standard deviation = 20 g/1,000 cal. (Assume that total carbohydrate intake can be measured exactly and no continuity correction is necessary. Round your answers to two decimal places.)

 USE SALT

- (a) What percentage of boys in this age range have carbohydrate intake above 144 g/1,000 cal?

✓ %

- (b) What percentage of boys in this age range have carbohydrate intake below 96 g/1,000 cal?

✓ %

Suppose boys in the age range of 12- to 14-years-old who live below the poverty level have a mean carbohydrate intake of 118 g/1,000 cal with a standard deviation of 18 g/1000 cal. (Assume that total carbohydrate intake can be measured exactly and no continuity correction is necessary. Round your answers to two decimal places.)

- (c) What percentage of boys in this age range and economic environment have carbohydrate intake above 144 g/1,000 cal?

✓ %

- (d) What percentage of boys in this age range and economic environment have carbohydrate intake below 96 g/1,000 cal?

✓ %

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3. [2.5/2.5 Points]

DETAILS

ROSBIOSTAT8 5.E.031-035.S.

1/3 Submissions Used

MY NOTES

ASK YOUR TEACHER

Blood Chemistry

In pharmacologic research a variety of clinical chemistry measurements are routinely monitored closely for evidence of side effects of the medication under study. Suppose typical blood-glucose levels are normally distributed, with mean = 94 mg/dL and standard deviation = 39 mg/dL. (Assume that blood-glucose levels can be measured exactly and no continuity correction is necessary.)

 USE SALT

- (a) If the normal range is 65–120 mg/dL, then what percentage of values will fall in the normal range? (Round your answer to two decimal places.)
- ✓ %
- (b) In some studies only values at least 1.5 times as high as the upper limit of normal are identified as abnormal. What percentage of values would fall in this range? (Round your answer to two decimal places.)
- ✓ %
- (c) What percentage of values would fall in the range of at least 2.0 times the upper limit of normal? (Round your answer to two decimal places.)
- ✓ %
- (d) Frequently, tests that yield abnormal results are repeated for confirmation. What is the probability that for a normal person a test will be at least 1.5 times as high as the upper limit of normal on two separate occasions? (Round your answer to four decimal places.)
- ✓
- (e) Suppose that in a pharmacologic study involving 4,100 patients, 74 patients have blood-glucose levels at least 1.5 times the upper limit of normal on one occasion. What is the probability that this result could be due to chance? (Round your answer to four decimal places.)

✗

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4. [7/7 Points]

DETAILS

ROSBIOSTAT8 5.E.036-041.S.

2/3 Submissions Used

MY NOTES

ASK YOUR TEACHER

Cancer

A treatment trial is proposed to test the efficacy of vitamin E as a preventive agent for cancer. One problem with such a study is how to assess compliance among participants. A small pilot study is undertaken to establish criteria for compliance with the proposed study agents. In this study, 10 patients are given 400 IU/day of vitamin E and 10 patients are given similar-sized placebo capsules over a 3-month period. Their serum vitamin E levels are measured before and after the 3-month period, and the change (3-month – baseline) is shown in the given table.

Group	Mean	<i>sd</i>	<i>n</i>
Vitamin E	0.78	0.44	10
Placebo	0.06	0.13	10

 USE SALT

- (a) Suppose a change of 0.39 mg/dL in serum levels is proposed as a test criterion for compliance; that is, a patient who shows a change of ≥ 0.39 mg/dL is considered a compliant vitamin E taker. If normality is assumed, what percentage of the vitamin E group would be expected to show a change of at least 0.39 mg/dL? (Round your answer to two decimal places.)

81.23



%

(b) Is the measure in part (a) a measure of sensitivity, specificity, or predictive value?

sensitivity
 specificity
 predictive value

(c) What percentage of the placebo group would be expected to show a change of not more than 0.39 mg/dL? (Round your answer to two decimal places.)

99.44 %

(d) Is the measure in part (c) a measure of sensitivity, specificity, or predictive value?

sensitivity
 specificity
 predictive value

(e) Suppose a new threshold of change, Δ mg/dL, is proposed for establishing compliance. We wish to use a level of Δ such that the compliance measures in parts (a) and (c) for the patients in the vitamin E and placebo groups are the same. What should Δ be (in mg/dL)? (Round your answer to four decimal places.)

$\Delta = 0.2242$ mg/dL

What would be the compliance (as a percent) in the vitamin E and placebo groups using this threshold level? (Round your answers to two decimal places.)

vitamin E 89.67 %

placebo 89.67 %

(f) Suppose we consider the serum vitamin E assay as a screening test for compliance with vitamin E supplementation. Participants whose change in serum vitamin E is $\geq \Delta$ mg/dL will be considered vitamin E takers, and participants whose change is $< \Delta$ mg/dL will be considered placebo takers. Choose several possible values for Δ , and construct the receiver operating characteristic (ROC) curve for this test. What is the area under the ROC curve (as a percent)? (*Hint*: The area under the ROC curve can be computed analytically from the properties of linear combinations of normal distributions. Round your answer to two decimal places.)

%

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