10.2 Review Questions

10.2.R1

1/1 point (graded)

Suppose we a data set where each data point represents a single student's scores on a math test, a physics test, a reading comprehension test, and a vocabulary test.

We find the first two principal components, which capture 90% of the variability in the data, and interpret their loadings. We conclude that the first principal component represents overall academic ability, and the second represents a contrast between quantitative ability and verbal ability.

What loadings would be consistent with that interpretation? Choose all that apply.

- [ ] (0.5, 0.5, 0.5, 0.5) and (0.71, 0.71, 0, 0)
- [ ] (0.5, 0.5, 0.5, 0.5) and (0, 0, -0.71, -0.71)
- [x] (0.5, 0.5, 0.5, 0.5) and (0.5, 0.5, -0.5, -0.5)
- [x] (0.5, 0.5, 0.5, 0.5) and (-0.5, -0.5, 0.5, 0.5)
- [ ] (0.71, 0.71, 0, 0) and (0, 0, 0.71, 0.71)
- [ ] (0.71, 0, -0.71, 0) and (0, 0.71, 0, -0.71)

✔

Explanation

For the first two choices, the two loading vectors are not orthogonal. For the fifth

and sixth choices, the first set of loadings only has to do with two specific tests. For the third and fourth pairs of loadings, the first component is proportional to average score, and the second component measures the difference between the first pair of scores and the second pair of scores.

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Answers are displayed within the problem