STAT140/240 Homework1

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Due on Thursday, Oct 13, 2016

Instruction:

• When applicable, describe the methods you used. Present your findings effectively by using tables and figures.

• When writing proofs, provide sufficient justifications.

• When appropriate, all relevant code should be handed in as appendices.

1. [STAT140/240] Write an R function that can do the following things:
   • It takes two R^2 vectors as the two arguments.
   • It calculates the distance and angle between the two vectors.
   • It projects the first vector onto the second vector.
   • It visualize the projection result.

Test your function and show that it does work.

2. [STAT140/240] Choose a picture you like and conduct approximations using singular value decomposition (SVD).

3. [STAT240] Show that the vectors generated by the Gram-Schmit process are indeed orthogonal with each other.

4. [STAT240 (optional)] Read “Gerald S. Rogers. (1984) Kronecker Products in ANOVA - A First Step. The American Statistician, 38: 197-202.” If you have already taken STAT200C, I encourage you to use properties of Kronecker products (find them online or from a textbook) to replicate some results we know about balanced two-way ANOVA.