Problem Sets Between Test 1 and Test 2

*Only turn in problems that are **not** bracketed.* Bracketed problems are additional problems you can look at. Round brackets indicate problems that may help you with problems that are assigned; square brackets are additional problems on material that you should know, but you are not required to write up solutions; curly brackets are truly optional and may contain extra nuggets that you will not be required to know but may be interested in.

Additional assignments will be filled in over time.

PS	Due	Source	Problems
8	Tue 3/6	FASt 5	**26ab** Pearson stat [26c] Pearson stat **31** twins
		App C	**3** factoring [4–7]
		Extra Problems	**1** LA LA Land
9	Fri 3/9	FASt 5	**27** which distribution? **28** HWE GOF **30** plants **32** alternative way to compute e_i **34** Mendel
10	Tue 3/13	FASt 5	**35** equivalent **36** T2D
		FASt C	**9** span **10** span **16−18** transpose
11	Fri 3/16	FASt 6	**2** trebuchet [3] **9** **11** expected value and dot product
12	Thu 3/29	FASt 6	**1** A vs LA **6** A **8** vector identity **12** A vs LA **16abc** no intercept

Extra Problems

1 Let $\boldsymbol{x} = \langle 3, 3, 5, 5 \rangle$ Let $\boldsymbol{Y} = \langle Y_1, Y_2, Y_3, Y_4 \rangle \overset{\text{iid}}{\sim} \mathsf{Norm}(20, 3)$. Let $\boldsymbol{v}_0 = \langle 1, 1, 1, 1 \rangle$, $\boldsymbol{v}_1 = \langle -1, -1, 1, 1 \rangle$, $\boldsymbol{v}_2 = \langle -1, 1, -1, 1 \rangle$, and $\boldsymbol{v}_3 = \langle -1, 1, 1, -1 \rangle$.

  a) Show that $\boldsymbol{v}_i \perp \boldsymbol{v}_j$ whenever $i \neq j$.
  b) Determine the unit vectors $\boldsymbol{u}_i$ in the direction of each $\boldsymbol{v}_i$.
  c) Determine the distribution of $A = \boldsymbol{u}_0 \cdot \boldsymbol{Y}$.
  d) Determine the distribution of $B = \boldsymbol{u}_1 \cdot \boldsymbol{Y}$.
  e) Let $\boldsymbol{C} = \mathrm{proj}(\boldsymbol{Y} \to \boldsymbol{v}_2)$. Determine the distribution of $|\boldsymbol{C}|^2$.
  f) Let $\boldsymbol{D} = \mathrm{proj}(\boldsymbol{Y} \to \boldsymbol{v}_3)$. Let $\boldsymbol{E} = \boldsymbol{C} + \boldsymbol{D}$. Determine the distribution of $|\boldsymbol{E}|^2$.