

MATH V1201 PROBLEM SET 1
DUE SEPTEMBER 15, 2009.

INSTRUCTOR: ROBERT LIPSHITZ

- (1) In the textbook:
§12.1 #6, 21, 29
§12.2 #6, 31, 41
§12.3 #1, 4, 9, 51
§15.7 #1, 4, 6
§15.8 #1, 4, 6
- (2) A class had students Alice, Bob, Caroline, Dan and Elinore. Their average homework and average exam scores were:

Alice	5	25
Bob	7	13
Caroline	2	20
Dan	3	20
Elinore	8	15

- (a) Compute the class's recentered homework score vector and recentered exam score vector.
- (b) Compute the recentered, normalized homework score vector and the recentered, normalized exam score vector.
- (c) Compute the correlation between the class's homework scores and the class's exam scores.
- (d) Was a student's average score on the homework a good predictor for his or her score on the exam?
- (3) (a) Find a nonzero vector \vec{w} in \mathbb{R}^2 orthogonal to the vector $\vec{v} = (3, 5)$.
Hint: you want a vector \vec{w} such that $\vec{v} \cdot \vec{w} = 0$. Translate this into a linear equation in two variables.
- (b) Find a nonzero vector \vec{w} in \mathbb{R}^3 orthogonal to the vectors $\vec{u} = (1, 1, 1)$ and $\vec{v} = (0, 1, 2)$.
Hint: Do the same as in the previous part; this time, you should be trying to find a solution to two linear equations in three variables.

Review:

- (4) Let $j(t)$ denote the number of jobs t months from now. For each of the following, translate the English into a formula about $j(t)$ and its derivatives. (I've done part (4a) for you as an example.)
- (a) "The economy is currently losing jobs."
Solution. $j'(0) < 0$.
- (b) "Fortunately, the rate of job losses is slowing."
- (c) "Unfortunately, the rate at which job losses is slowing is decreasing."
- (d) "The number of jobs is expected to bottom out in six months."

If you had trouble with	Do problems
12.1.6	12.1.5, 12.1.23–12.1.27
12.1.21	12.1.20, 12.1.22
12.1.29	12.1.23–12.1.32
12.2.6	12.2.5
12.2.31	12.2.27–12.2.30
12.2.41	12.2.42
12.3.1	Talk to me or a TA
12.3.4	12.3.3–12.3.8
12.3.9	12.3.10
12.3.51	12.3.15–12.3.20, 12.3.52
15.7.1	15.7.2
15.7.4	15.7.3
15.7.6	15.7.5, 15.7.7–8
15.8.1	15.8.2
15.8.4	15.8.3
15.8.6	15.8.5, 15.8.7–8

E-mail address: r12327@columbia.edu