

Linear Analysis II Set 9

1. Use the Gram-Schmidt procedure to orthogonalize $\begin{bmatrix} 1 \\ 0 \\ 1 \end{bmatrix}, \begin{bmatrix} 1 \\ 1 \\ 1 \end{bmatrix}, \begin{bmatrix} 2 \\ 1 \\ 1 \end{bmatrix}$.

2. Find the vector in the span of $\begin{bmatrix} 4 \\ 2 \\ 2 \\ 1 \end{bmatrix}, \begin{bmatrix} 0 \\ -2 \\ 1 \\ 2 \end{bmatrix}$ and $\begin{bmatrix} 1 \\ 0 \\ -2 \\ 0 \end{bmatrix}$ closest to $\begin{bmatrix} 1 \\ 0 \\ 1 \\ 0 \end{bmatrix}$.

3. Find the line $f(x) = mx + b$ that best fits the data below. (For these type of exercises, use a calculator or computer to help with the calculations. Ask if you don't know how to do this.) Using this model, what is an estimate for the percentage of children in the US who were obese in 2010?

Percentage of children in the US classified as obese								
year	1962	1974	1980	1994	1999	2002	2006	2008
percent	4	4	7	11	15	16	17	20

4. Find a function of the form $f(x) = ax^2 + bx + c$ to fit this data:

Oil production in the US										
year	1920	1930	1940	1950	1960	1970	1980	1990	2000	2010
(barrels/day)/1000	1210	2460	4107	5407	7035	9637	8597	7355	5822	5500

5. If (x, y, b) is a row in the table below, let $g(x, y) = \begin{cases} 1 & \text{if } b = \text{Yes,} \\ -1 & \text{if } b = \text{No.} \end{cases}$ Find a function of the form $f(x, y) = ax + by + c$ which best approximates $g(x, y)$. What does this model predict for a 22 year old with 16 years of education?

1994 US census data		
age	education (years)	earns \geq \$50k
34	16	Yes
29	13	No
48	20	Yes
37	14	Yes
48	14	No
32	12	No
76	18	Yes
44	16	Yes
20	13	No
29	12	No

