Assessment Quiz #1

MATH 316 — Linear Algebra II
Wednesday, Feb 6

Please print your name:

Problem 1. We want to find values for the parameters a,b,c such that $z=a+bx+c\ln(y)$ best fits some given points $(x_1,y_1,z_1),(x_2,y_2,z_2),\ldots$ Set up a linear system such that $[a,b,c]^T$ is a least squares solution.

Problem 2. Write down a precise definition of what it means for vectors $\boldsymbol{v}_1,\boldsymbol{v}_2,\ldots,\boldsymbol{v}_m\in\mathbb{R}^n$ to be linearly independent.

Vectors $\boldsymbol{v}_1,\boldsymbol{v}_2,\ldots,\boldsymbol{v}_m\in\mathbb{R}^n$ are linearly independent if and only if ...

Problem 3. Fill in the blanks.

(a) Let $A=\begin{bmatrix}1&2&0&3\\0&0&1&4\end{bmatrix}$. A basis for null$(A)$ is ______.

(b) $\begin{bmatrix}a&b\\c&d\end{bmatrix}^{-1}=$ ______

(c) $\hat{\boldsymbol{x}}$ is a least squares solution of $A\boldsymbol{x}=\boldsymbol{b}$ if and only if ______.

(d) col(A) is the orthogonal complement of ______. null(A) is the orthogonal complement of ______.

(e) The linear system $A\boldsymbol{x}=\boldsymbol{b}$ is consistent if and only if $\boldsymbol{b}$ is orthogonal to ______.

(f) The projection matrix for orthogonally projecting onto col(A) is $P=$ ______..

(g) If W is the space of all solutions to $x_1+2x_2+x_3-x_4=0$, then $\dim W=$ ______ and $\dim W^\perp=$ ______.

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