Week 2 Day 2

Math in Your Life

Turn to someone sitting near you. Make sure you know each other's names, and then take about 2 minutes to discuss:

How do you think math as a whole, or Math 18 in particular, fits into your life? For example, how does it contribute towards your career goals, or towards making you who you want to be?

Linear Independence

1. (A) True or (B) False? Suppose A is a matrix such that $A\mathbf{x} = \mathbf{0}$ has only the trivial solution. Then the columns of A are linearly independent.

2. (A) True or (B) False?   The columns of any 4×3 matrix are linearly independent.

3. For how many values of h are the following vectors linearly dependent?

$$\begin{bmatrix} 1 \\ 0 \\ 1 \end{bmatrix}, \begin{bmatrix} 2 \\ 1 \\ 1 \end{bmatrix}, \begin{bmatrix} 2 \\ 1 \\ h \end{bmatrix}$$

(A) No values of h

(B) Exactly one value of h

(C) Infinitely many values of h

(D) None of the above

4. (A) True or (B) False? If A is any 3×3 matrix with linearly independent columns, the reduced row echelon form of A must be

$$\begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}.$$

5. (A) True or (B) False?   If A is any 3×4 matrix with linearly independent columns, the reduced row echelon form of A must be

$$\begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 \end{bmatrix} .$$