

MATH221
Fall 2018
Bonus Problems

1. (1pt) Assigned on: Solved on ?: by: Diae Mizon
Let ABC be a triangle so that $AB^2 + AC^2 = BC^2$. True or False? $\angle BAC = 90^\circ$.
2. (1pt) Assigned on: Solved on: September 14, 2018 by: Greg Friedman
Let $\mathbf{x}, \mathbf{y} \in \mathbf{R}^2$. Consider the set of vectors $\{\mathbf{z} : \mathbf{z} = t\mathbf{x} + (1-t)\mathbf{y}, 0 \leq t \leq 1\}$. Show that set Z is a segment of straight line connecting \mathbf{x} and \mathbf{y} .
3. (1pt) Assigned on: September 27, 2018 Solved on: by:
Let $\{\mathbf{a}_1, \dots, \mathbf{a}_n\}$ be a set of linearly independent vectors. True or False? If B is a matrix with linearly independent columns, then the vectors $\{B\mathbf{a}_1, \dots, B\mathbf{a}_n\}$ are linearly independent.
4. (1pt) Assigned on: October 9, 2018 Solved on: October 9, 2018 by: Lyeba Hameed
Show that $(AB)^T = B^T A^T$. (Hint: Let $B = [\mathbf{b}_1, \dots, \mathbf{b}_n]$. Consider the matrix $B_1 = [\mathbf{b}_1, 0, \dots, 0]$. First show that $(AB_1)^T = B_1^T A^T$, then use that $B = B_1 + B_2 + \dots + B_n$ where B_i is a matrix with column i being \mathbf{b}_i , and all other columns being 0.)
5. (1pt) Assigned on: November 8, 2018 Solved on: by:
Let A and B be two matrices so that $\text{rank } A = \text{rank } B$. True or False? A and B are row equivalent.
6. (1pt) Assigned on: November 13, 2018 Solved on: by:
Let A be a 3×3 matrix. Show that the cofactor expansion across any row or across any column leads to the same result.
7. (1pt) Assigned on: November 13, 2018 Solved on: by:
Show that $\det AB = \det A \det B$.
8. (1pt) Assigned on: November 13, 2018 Solved on: by:
Show that $\det A = \det A^T$.
9. (1pt) Assigned on: November 29, 2018 Solved on: by:
Prove that $\det A = 0$ yields linear dependence of columns of A .