Vectors and Linear Equation

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1 Vectors and Linear Equation

1. Compute the dot product of u . v
   u = (3, 1, 4) and v = (2, 2, 4)

   - (5, 3, 8)
   - (6, 2, 16)
   - (8, 8)
   - (12, 16)

   Answer: the dot product is (3*2, 1*2, 4*4) = (6, 2, 16)

2. the set of all points such that
   x = x0 + tv,
   represents the line through x0 that is parallel to v and the varaible t is called a parameter. Question: what if x0 = 0

   - plane including origin
   - a point at the origin
   - line passing through the origin

   Answer: it is a line passing thorugh the origin

3. Match the properties of vectors
   a) u + v = v + u
   b) (u + v) + w = u + (v + w)
   c) u + 0 = u
   1) zero identity
   2) associative law
   3) commutative law

   - a) = 2) , b) = 1), c) = 3)
   - a) = 3), b) = 2), c) = 1)
   - a) = 3), b) = 1), c) = 2)

- a) = 2), b) = 3), c) = 1)

Answer:
a) = 3) commutative law
b) = 1) zero identity
c) = 2) associative law

4. Find the augmented matrix for the linear system
   x1 = 1
   x2 = 2
   x3 = 3

   - $X = \left(\begin{bmatrix} 1 & 0 & 0 & 1 \\ 0 & 1 & 0 & 2 \\ 0 & 0 & 1 & 3 \end{bmatrix} \right)$
   - $Y = \left(\begin{bmatrix} 1 & 0 & 0 \\ 0 & 2 & 0 \\ 0 & 0 & 3 \end{bmatrix} \right)$
   - $Z = \left(\begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix} \right)$

   Answer: $X = \left(\begin{bmatrix} 1 & 0 & 0 & 1 \\ 0 & 1 & 0 & 2 \\ 0 & 0 & 1 & 3 \end{bmatrix} \right)$

5. Fill in the blank.
   If a linear system has [ ] solution, its called [ ]

   - zero, consistent
   - at least one, consistent
   - at least one, inconsistent
   - infinite, in consistent

   Answer: Theorem states that if a linear system has at least one solution, it's called consistent, otherwise it's call inconsistent

6. What does a linear equation in (a) R^2 and (b) R^3 represents?

   - plane, line
   - line, plane
   - dot, line
   - line, dot

   Answer: a linear equation in (a) R^2 represents a line and (b) R^3 represents a plane