

For b to be in the spon of {v<sub>1</sub>, v<sub>2</sub>, v<sub>3</sub>} b, must be a linear combination of v<sub>1</sub>, v<sub>2</sub>, v<sub>3</sub> meanings: C,V, + C2V3 + C3V3 = B swhere b EIR3, CITCHESEIR C, [ ] + C, [ ] + C, [ ] = [ ] Whose C, C2, C3, EIR which is equivalent to the system. Which is Equivaria.

C, +2C2 + C3 = b,

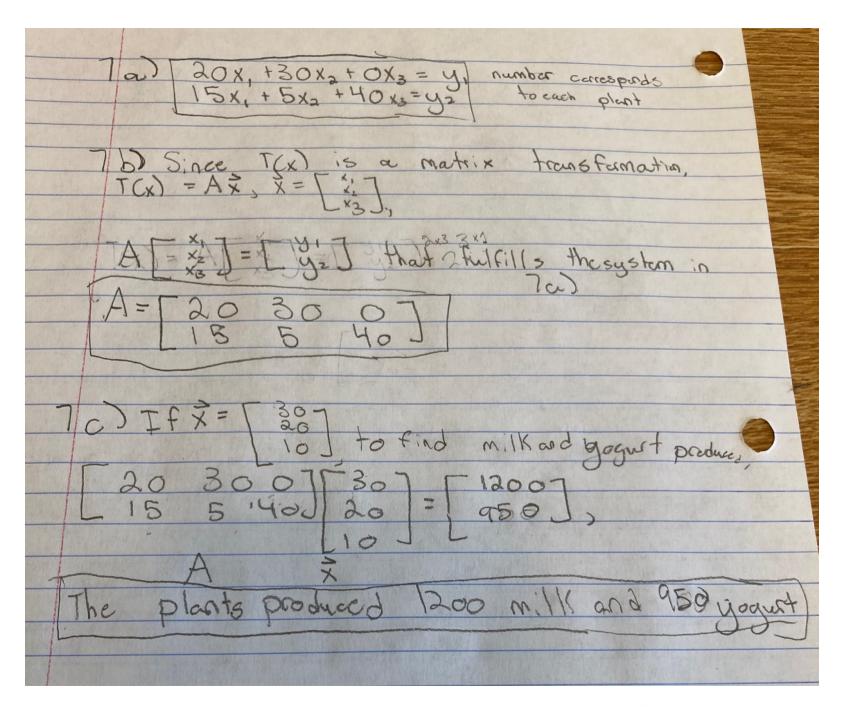
C, -C3 = b2 Meaning by b2, and b3 must

2C, +C2+3C3=b2 be solutions to the system on the left

for b to be in the span of {v, v2, v3} 4/By oTheorem u7, conset = of yat least avectors is linearly dependent if one vectoring alinear combination of the others. 2+32 = 2(2)+34, meaning Evyy2v+3u3 is linearly dependent. Any pair from the set & v, ug 2v+3us is linearly independent because each of the sets, Ev, wi, { viav+3 wis and Eugantsus, cannot have one of their vectors written as a linear combination of the other, as { Usus is linearly independent. Thus by Theorem 7, all pairs from the set are linearly independen

T(x+y) = T(x)+T(y) T(CZ) = T([CX,]) = CX, J + CX, w Both conditions, T(x+y)=T(x)+T(y), and T(cx) = cT(x) are true, maning T(x) is alinear transformation D 56) By Theorem 12, 1 is one-to-one I fand Johly if columns of A, whose A is the Standard matrix, are linearly independent.
By theorem that TCX) = Ax as TCX) is alinear to the standard, meaning TCX) can be curiton as: For IT tolber one tolone the columns of Asyandus, must be linearly independent, meaning that trandu are linearly independent if and only if T is one-to-one.

Standad matrix 1 0 0 A: 1 1 0 6 b) For T(x) to be one to one by Theorem. 12, the columns of A must be linearly independent. To solve for this, find solutions to The only solution is x, =0, x=0, xs=0, which is the trivial solution meaning the columns of A are linearly independent and T(x) is one-to-ane. Span IRM, meaning there is a pivot in every row of A, Ruhich is, proven by Theorem 12 500 Since A has more rows than 20 columns, it cannot have a pivot in every row. Since A doesn't have a pivot in every row,
IPM or 124 and T is not on-to



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