Source: [KBe2020math530refExr0nRetIndex]

#ret

Exercises

1.A.2

$$\left(\frac{-1+\sqrt{3}i}{2}\right)^3 = \left(\frac{-1+\sqrt{3}i}{2}\right)\left(\frac{-2-2\sqrt{3}i}{4}\right) = \frac{2+\cancel{2\sqrt{3}i-2\sqrt{3}i}-2*3*i^2}{8} = \frac{8}{8} = 1$$

1.A.10

$$\begin{aligned}(4,-3,1,7)+2(x_1,x_2,x_3,x_4) = (5,9,-6,8)\\ 4+2x_1 = 5,\\ -3+2x_2 = 9,\\ 1+2x_3 = -6,\\ 7+2x_4 = 8\\ x = (\frac{1}{2},6,\frac{-7}{2},\frac{1}{2})\end{aligned}$$

Not sure how to do this with matrices?

1.A.15

$$\begin{aligned}&\lambda(x+y)\\ &= \lambda(x_1+y_1, x_2+y_2, x_3+y_3 \ldots x_n+y_n)\\ &= (\lambda(x_1+y_1), \lambda(x_2+y_2), \lambda(x_3+y_3) \ldots \lambda(x_n+y_n))\\ &= (\lambda x_1+\lambda y_1, \lambda x_2+\lambda y_2, \lambda x_3+\lambda y_3 \ldots \lambda x_n+\lambda y_n)\\ &= (\lambda x_1, \lambda x_2, \lambda x_3 \ldots \lambda x_n)+(\lambda y_1, \lambda y_2, \lambda y_3 \ldots \lambda y_n)\\ &= \lambda(x)+\lambda(y) = \lambda x+\lambda y\end{aligned}$$

Matrices for Solving Systems

I'm not sure what I should notice, although it's interesting that they are all 2x2 matrices that are (or can be decomposed into) one number away from the identity. I think we mentioned that they were "essential matrices" or something?

Geometric Interpretation of Dot Product

We talked about it in class, and learned it in physics, but a dot product $A \cdot B$ can be interpreted as the magnitude of A's projection onto B multiplied by the magnitude of B. $A \cdot B = |A||B|cos\theta$.

Dot Product on Vectors as a Group

No. Dot product returns a scalar, which means that this operation is distinctly not closed.

After class on 3 Sep, Daniel mentioned that it might be a group if you define a modified dot product where you take the normal dot product and put it in the direction of the second vector. However, this doesn't work because the for any given Nx1 matrixe A the identity e has to satisfy $A \cdot e = e \cdot A = A$. Thus, the definition that relies on the direction of the second operand will break when the identity is on one of the sides. **Because dot product relies on the angle between the two vectors, I think it would be difficult to find an angle for an identity vector that works with all other angles of vectors. I'm not sure how to formalize this…** #todo

Inverse of a matrix

I tried this for the previous homework when we were to determine if 2x2 matrices were groups under multiplication, but didn't end up getting anywhere. I will try again…

srcIdentityMatrixFormula.png

I got something like $w = \frac{1-\frac{bc}{bc-ad}}{a}$, which I don't think is correct. It's also been an hour and a half, so I think I'll have to leave this here for now. #todo