Linear Algebra. Test 2. Variant 1.

First name	Last name	Group	Points#1	Points#2
		BS1-		

I am, _____ (initials), confirming that I have read the following rules and agree to comply with them, that all solutions on this paper is my own work.

_______________ (signature)

Rules:

- no talking AT ALL is allowed during the exam and after it (if you are still in the room)
- when time is up, you have to put down your pen (pencil) and do NOT write anything else
- you can NOT leave your seat till the end of the test
- any electronic devices are not allowed

1. (***5 points***) Subspace S of $\mathbb{R}^3$is spanned by vectors $a = \begin{bmatrix} 2 \\ 4 \\ 3 \end{bmatrix}$ and $b = \begin{bmatrix} 1 \\ 1 \\ 1 \end{bmatrix}$. Represent the vector $x = \begin{bmatrix} 1 \\ 2 \\ 3 \end{bmatrix}$ as a sum of projections onto S and $S^{\perp}$.

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		BS1-	

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_______________ (signature)

2. (***5 points***) Using least squares method find coefficients of a curve $f(x) = acos(x+b)$ that best fits following points:

x	0	π/4	π/2
$f(x)$	-1	0	1

Note: $\cos(x+y) = \cos(x)\cos(y) - \sin(y)\sin(x)$.

3. ***(3+2 points)***. Let $\mathrm{a} = (1, 0, 1)^{\mathrm{T}},\ \mathrm{b} = (1, 1, 0)^{\mathrm{T}},\ \mathrm{c} = (0, 1, 1)^{\mathrm{T}}$.
   Provide Gram-Schmidt procedure to obtain orthonormal basis *(3 points)*. Write corresponding QR factorization *(2 points)*.