Linear Algebra. Test 2. Variant 2.

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 $a = \begin{bmatrix} 1 \\ 1 \\ 1 \end{bmatrix}$ and $b = \begin{bmatrix} 3 \\ 2 \\ 5 \end{bmatrix}$. Represent the vector $x = \begin{bmatrix} 1 \\ 4 \\ 1 \end{bmatrix}$ as a sum of projections onto S and $S^{\perp}$.

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First name	Last name	Group	Points#3
		BS1-	

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_______________ (signature)

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

x	π/2	3π/4	π
$f(x)$	1	0	-1

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

3. ***(3+2 points)***. Let $\mathrm{a} = (0, 1, 1)^{\mathrm{T}},\ \mathrm{b} = (1, 0, 1)^{\mathrm{T}},\ \mathrm{c} = (1, 1, 0)^{\mathrm{T}}$

Provide Gram-Schmidt procedure to obtain orthonormal basis *(3 points)*. Write corresponding QR factorization *(2 points)*.