You will have twenty minutes to take this quiz. Read the instructions carefully. There are more questions on the back of this page.

1. (4 points) You do not need to show your work. Only the answer will be graded.

Let \( \vec{a} = \begin{pmatrix} 1 \\ 2 \\ 3 \end{pmatrix}, \vec{b} = \begin{pmatrix} -1 \\ 1 \\ -1 \end{pmatrix} \) and \( \vec{c} = \begin{pmatrix} 1 \\ 2 \end{pmatrix} \). Which of the following expressions are nonsense? Evaluate the sensible ones.

1. \( \vec{a} + \vec{c} \)
2. \( \vec{a} \cdot \vec{c} \)
3. \( \vec{a} \vec{b} \)
4. \( \vec{a} - 2 \vec{b} \)
2. (6 points) Show your work. Partial credit may be awarded.

Let \( \vec{a} = \begin{pmatrix} 2 \\ 1 \\ 1 \end{pmatrix} \) and \( \vec{b} = \begin{pmatrix} 1 \\ 1 \\ 0 \end{pmatrix} \). Find \( \vec{a}^\parallel \) and \( \vec{a}^\perp \) so that \( \vec{a} = \vec{a}^\parallel + \vec{a}^\perp \), where \( \vec{a}^\parallel \) is parallel to \( \vec{b} \) and \( \vec{a}^\perp \) is perpendicular to \( \vec{b} \).