Instructions. Show all work, with clear logical steps. No work or hard-to-follow work will lose points.

1.) (5 points) Compute the orthogonal projection of $\mathbf{v} = \langle -1, 3, 2\rangle$ onto $\mathbf{w} = \langle 4, 2, 2\rangle$.

2.) (5 points) Find a vector that is orthogonal to both $\mathbf{v} = \langle -1, 3, 2\rangle$ and $\mathbf{w} = \langle 4, 2, 2\rangle$.

3.) (5 points) Find the equation of the plane that is parallel to the vectors $\mathbf{v} = \langle -1, 3, 2\rangle$ and $\mathbf{w} = \langle 4, 2, 2\rangle$ passing through the point $(2, 0, -2)$.

4.) (5 points) Identify the surface defined by

$$x^2 + y^2 + 6z^2 + 6x = -8.$$