Name:

Problem	Points	Score
1	25	
2	25	
3	25	
4	25	
Total	100	

Notes: The exam is closed book and closed notes.

(25 pts) Problem No. 1:

Find a matrix A whose eigenvalues are -2 and 4, and whose eigenvectors are $[-1, 1]$ and $[5, 1]$. Is this answer unique?

Problem No. 2:

(25 pts) Find the eigenvalues for $A = \begin{bmatrix} 2 & -1 \\ 2 & 0 \end{bmatrix}$. Explain why this answer makes sense.

(25 pts) Problem No. 3:

Are the vectors $\vec{u} = [1,2,-4]$, $\vec{v} = [-5,3,-7]$, and $\vec{w} = [-1,4,2]$ in the same plane? Justify your conclusions with detailed calculations – guessing yes or no with no supporting work gets you no credit. You will be graded on the thoroughness of your solution.

(25 pts) Problem No. 4: Solve the second-order differential equation (find $y(t)$) by converting it to two first-order differential equations: $2y'' + 5y' - 3y = 0, y(0) = -4, y'(0) = 9$. Note that $y' = dy/dt$, and $y'' = d^2y/dt^2$.