# Quiz 07

## Vector Spaces and Subspaces

(8 points) Which of the following sets $S$ are subspaces of the corresponding vector spaces $V$?(**No partial credits**)
(i)$V = \mathbb{R}^3$ and $S$ is the set of vectors $(x, y, z)$ satisfying $x + 2y - z = 0$.
(ii) $V = P_2$ (the set of polynomials of degree at most 2) and $S$ is the set of polynomials of the form $bt + c$.
(iii) $V$is the set of all twice differentiable functions and $S$ is the set of the functions satisfying the differential equation $y'' - 3y' + 2y = 0$.
(A)(i) and (ii) only. (B) (i) and (iii) only.
(C) (ii) and (iii) only. (D) (i), (ii) and (iii).

## Determinants as Area or Volume

Let S be the parallelogram determined by the vectors $\mathbf{b}_1 = \begin{bmatrix} 1 \\ 3 \end{bmatrix}$ and $\mathbf{b}_2 = \begin{bmatrix} 5 \\ 1 \end{bmatrix}$, and let $A = \begin{bmatrix} 1 & 0.1 \\ 0 & 2 \end{bmatrix}$.
(5 points)(a) Compute the area of S.
(7 points)(b) Compute the area of the image of S under the mapping $\mathbf{x} \mapsto A\mathbf{x}$.
(**No credits** for the answer without necessary explanation.)

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