key

QUIZ 18

1. (2 points) Let $A = \begin{bmatrix} 1 & 2 \\ -3 & 1 \end{bmatrix}$. Then $det(3A)$ is

$\det 3A = \begin{vmatrix} 3 & 6 \\ -9 & 3 \end{vmatrix} = 9 - (6)(-9)$
$= 9 + 54$
$= 63$

a. -15
b. 7
c. 21
d. 63

2. (2 points) Let H be the set of vectors of the form $\begin{bmatrix} a+b \\ 2a \\ -b \end{bmatrix}$ with a & b in $\mathbb{R}$. Then H is a

$\hookrightarrow = \begin{bmatrix} 1 \\ 2 \\ 0 \end{bmatrix} a + \begin{bmatrix} 1 \\ 0 \\ -1 \end{bmatrix} b$ basis is $\begin{bmatrix} 1 \\ 2 \\ 0 \end{bmatrix}, \begin{bmatrix} 1 \\ 0 \\ -1 \end{bmatrix}$

a. 3-dimensional subspace of $\mathbb{R}^3$
b. 2-dimensional subspace of $\mathbb{R}^3$
c. 1-dimensional subspace of $\mathbb{R}^3$
d. 0-dimensional subspace of $\mathbb{R}^3$

3. (2 points) Consider the vector space $\mathbb{P}_3$, and let the linear mapping $T: \mathbb{P}_3 \to \mathbb{R}^2$ be defined by $T(p) = \begin{bmatrix} p(0) \\ 2 \cdot p(0) \end{bmatrix}$. What is the kernel of T?

$\begin{bmatrix} p(0) \\ 2p(0) \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \end{bmatrix} \Rightarrow p(0) = 0$
& $p(t) = a_0 + a_1 t + a_2 t^2 + a_3 t^3$
$\Rightarrow a_0 = 0$

a. $\{0\}$
b. $\{ at + bt^2 \mid a, b \in \mathbb{R}\}$
c. $\{ at \mid a \in \mathbb{R}\}$
d. $\{ at + bt^2 + ct^3 \mid a, b, c \in \mathbb{R}\}$

4. (2 points) In the same situation as in question number 3, give the range of T.

$p(t) = a_0 + a_1 t + a_2 t^2 + a_3 t^3 \Rightarrow p(0) = a_0 \Rightarrow T(p) = \begin{bmatrix} a_0 \\ 2a_0 \end{bmatrix}$

a. $\left\{\begin{bmatrix} a \\ a \end{bmatrix} : a \in \mathbb{R}\right\}$
b. $\left\{\begin{bmatrix} 0 \\ 0 \end{bmatrix}\right\}$
c. $\left\{\begin{bmatrix} a \\ 2a \end{bmatrix} : a \in \mathbb{R}\right\}$
d. $\left\{\begin{bmatrix} 1 \\ 2 \end{bmatrix}\right\}$

5. (2 points) Recall the standard basis of $\mathbb{P}_2$ is $\mathcal{B} = \{1, x, x^2\}$ (where the variable is x instead of t). Consider the polynomial $p(x) = 2x^2 - 5$. What are the $\mathcal{B}$-coordinates of P? (ie: what is $[p]_{\mathcal{B}}$)

$$\begin{array}{c} 1 \\ x \\ x^2 \end{array} \begin{bmatrix} -5 \\ 0 \\ 2 \end{bmatrix}$$

a. $\begin{bmatrix} -5 \\ 2 \end{bmatrix}$
b. $\begin{bmatrix} -5 \\ 0 \\ 2 \end{bmatrix}$
c. $\begin{bmatrix} 2 \\ 0 \\ -5 \end{bmatrix}$
e. none of these