Quiz 18

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

   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

   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?

   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.

   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 $[p]_{\mathcal{B}}$)

   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