

## MAT 300/500

## Quiz 0

Spring 2023

1. What is the dimension of the vector subspace of  $P_2$  spanned by (consists of all linear combinations of) the polynomials  $t$ ,  $1 - t$ , and  $t(1 - t)$ ?

- a) 5                      b) 1                      c) 4                      d) 2                      e) 3

Correct Answer: 3

2. Which polynomial has coordinate vector with respect to the standard basis  $\{1, t, t^2\}$  equal to:  $\begin{pmatrix} 1 \\ -2 \\ 0 \end{pmatrix}$ .

- a)  $(t + 1)^2$       b)  $(t - 1)^2 - t^2$       c)  $(t - 2)^2 + (t - 1)^2$       d)  $t^2 - (t - 1)^2$       e)  $(t + 2)^2$

Correct Answer:  $(t - 1)^2 - t^2$

3. Let  $S$  be the set  $\{(t - 4)^2, (t - 3)^2, t - 3\}$  of polynomials in  $P_2$ . Determine whether the following statements are True or False. The answers are in order i),ii), iii).

- i)  $S$  is a top-down basis of  $P_2$       ii)  $S$  spans  $P_2$       iii)  $S$  is linearly independent

- a) FFT                      b) TTT                      c) FFF                      d) TTT                      e) TTF

Correct Answer: TTT

4. Let  $S$  be the set  $\{(t - 1)^2, t - 1, t^2 - 1\}$  of polynomials in  $P_2$ . Determine whether the following statements are True or False. The answers are in order i),ii), iii).

- i)  $S$  is a basis of  $P_2$       ii)  $S$  spans  $P_2$       iii)  $S$  is linearly independent

- a) FFT                      b) TTT                      c) FFF                      d) TFT                      e) TFF

Correct Answer: FFF

5. If  $V$  is a vector space with dimension  $n + 1$ , and  $S = \{\mathbf{v}_1, \dots, \mathbf{v}_n\}$  is a set of  $n$  vectors in  $V$  then which of the following must be true:

- i)  $S$  cannot span  $V$       ii)  $S$  is a basis of  $V$       iii)  $S$  is linearly independent

- a) i) and ii) only      b) i) only      c) ii) only      d) ii) and iii) only      e) iii) only

Correct Answer: i) only