

MAT 300/500

Quiz 0

Spring 2019

1. What is the dimension of the vector subspace of P_2 spanned by (consists of all linear combinations of) the polynomials $1, 1 - t$, and t .
- a) 5 b) 1 c) 4 d) 2 e) 3
- Correct Answer: 2
2. What is the dimension of the vector subspace of P_2 which is spanned by the polynomials $t^2, 2(1 - t)t$ and $(1 - t)^2$?
- a) 5 b) 3 c) 4 d) 2 e) 1
- Correct Answer: 3
3. 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: $(t - 1)^2 - t^2$
4. Let S be the set $\{(t - 3)^2, (t - 2)^2, t - 3\}$ 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
5. 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
6. Which of the following are True statements about binomial coefficients, if $0 \leq k \leq d$?
- i) $\binom{d}{k} = \binom{d-1}{k-1} + \binom{d-1}{k}$ ii) $\binom{d}{k} = \binom{d}{d-k}$ iii) $\binom{d}{1} = \binom{d-1}{1}$
- a) FTT b) TTT c) TTF d) FTT e) TFT
- Correct Answer: TTF
7. Compute $\binom{4}{2} + \binom{4}{4}$:
- a) 8 b) 4 c) 5 d) 6 e) 7
- Correct Answer: 7
8. 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 spans V ii) S is a basis of V iii) S is linearly dependent
- a) i) and ii) only b) i) only c) ii) only d) ii) and iii) only e) iii) only
- Correct Answer: iii) only
9. Find the coefficient of $t - 1$ in the polynomial $1 - 4(t - 2) + (t - 2)^2$ when converted to the shifted basis $\{1, t - 1, (t - 1)^2\}$.
- a) -12 b) -4 c) -6 d) -8 e) -10
- Correct Answer: -6
10. If A is the change of basis matrix from B_1 to B_2 and C is the change of basis matrix from B_1 to B_3 , then the change of basis matrix from B_2 to B_3 is:
- a) AC^{-1} b) $C^{-1}A^{-1}$ c) AC d) CA^{-1} e) $(AC)^{-1}$
- Correct Answer: CA^{-1}