

MAT 300/500 Quiz 1 Answer Sheet

Spring 2022

Quiz ID: MVX

Name: _____

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Submit electronic answers at

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MAT 300/500

Quiz 1

Spring 2022

- 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) 1 b) 5 c) 3 d) 4 e) 2
- What is the dimension of the vector subspace of P_3 which is spanned by the polynomials t^2 , and $(1 - t)^2$?
 a) 2 b) 5 c) 1 d) 4 e) 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) $(t - 1)^2 - t^2$ b) $(t + 1)^2$ c) $(t + 2)^2$ d) $(t - 2)^2 + (t - 1)^2$ e) $t^2 - (t - 1)^2$
- 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) TTT b) FFT c) TTF d) FFF e) TTT
- 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) TTT b) FFT c) TFF d) FFF e) TFT
- Which of the following are True statements about binomial coefficients, if $0 \leq k \leq d$?
 i) $\binom{d}{k} = \binom{d-1}{k} + \binom{d-1}{k-1}$ ii) $\binom{d}{k} = \binom{d}{d-k}$ iii) $\binom{d}{1} = d \binom{d}{0}$
 a) TTT b) FTT c) TFT d) TTF e) FTT
- Compute $\binom{4}{2} + \binom{4}{3}$:
 a) 9 b) 8 c) 7 d) 10 e) 6
- 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) only b) i) and ii) only c) iii) only d) ii) only e) ii) and iii) only
- Find the coefficient of $t - 1$ in the polynomial $1 - (t - 2) + (t - 2)^2$ when converted to the shifted basis $\{1, t - 1, (t - 1)^2\}$.
 a) -4 b) -2 c) -6 d) -3 e) -5
- 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_3 to B_2 is:
 a) $C^{-1}A^{-1}$ b) AC^{-1} c) $(AC)^{-1}$ d) AC e) CA^{-1}