Name:

## Quiz 1

Spring 2016

1. What is the dimension of the vector space $P_{3}$ ?
a) 5
b) 6
c) 4
d) 2
e) 3

Correct Answer: 4
2. Choose a polynomial below which has coordinate vector with respect to the standard basis $\left\{1, t, t^{2}\right\}$ given by:

$$
\left(\begin{array}{c}
4 \\
-4 \\
1
\end{array}\right)
$$

a) $(t+1)^{2}$
b) $(t-1)^{2}$
c) $(t-3)^{2}$
d) $(t+2)^{2}$
e) $(t-2)^{2}$

Correct Answer: $(t-2)^{2}$
3. What is the dimension of the vector subspace of $P_{2}$ which is spanned by the polynomials $1, t$ and $1-t$ ?
a) 5
b) 2
c) 4
d) 3
e) 1

Correct Answer: 2
4. Let $S$ be the set $\left\{(t-3)^{2}, t-2,1\right\}$ 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) TTF

Correct Answer: TTT
5. Let $S$ be the set $\left\{(t-1)^{2}, t-1, t^{2}-1\right\}$ 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? Assume $d>1$ and $0<k<d$. The answers are in order i), ii), iii).
i) $\binom{d}{k}=\binom{d-1}{k-1}+\binom{d-1}{k}$
ii) $\binom{d}{k}=\binom{d}{d-k}$
iii) $\binom{d}{d}=1$
a) FTT
b) TTT
c) TTF
d) FFT
e) FTT

Correct Answer: TTT
7. Compute $\binom{5}{3}$ :
a) 18
b) 12
c) 15
d) 16
e) 10

Correct Answer: 10
8. Let $B=\left\{1, t-2,(t-2)^{2}\right\}$ be a shifted basis of $P_{2}$. Find the change of basis matrix from $B$ to the standard basis $\left\{1, t, t^{2}\right\}$. Keep both bases in the order given. What is the second row of this matrix?
a) $0 \quad 4 \quad-1$
b) $0 \quad 0 \quad 1$
c) $\begin{array}{llll}0 & 1 & -4\end{array}$
d) $\begin{array}{lll}1 & -2 & 4\end{array}$
e) $\begin{array}{lll}-4 & 1 & 2\end{array}$

Correct Answer: $0 \quad 1 \quad-4$
9. Use the matrix in the previous question to find the coefficient of $t$ in the polynomial $1-(t-2)+2(t-2)^{2}$ when converted to the standard basis.
a) -12
b) 8
c) -6
d) -9
e) 9

Correct Answer: - 9
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) $A C^{-1}$
b) $C^{-1} A^{-1}$
c) $A C$
d) $C A^{-1}$
e) $(A C)^{-1}$

Correct Answer: $C A^{-1}$

