

MAT 300/500

Quiz 1

Spring 2019

1. Find the derivative: $\frac{d}{dt}B_2^3(t)$.

- a) $6t - 9t^2$ b) $9t - 6t^2$ c) $2t - 3t^2$ d) $6t - 3t^2$ e) $2t - 6t^2$

Correct Answer: $6t - 9t^2$ 2. Choose a correct equivalent expression for $B_3^4(t)$:

- a) $tB_2^2(t) + (1-t)B_3^2(t)$ b) $tB_1^3(t) + (1-t)B_2^3(t)$ c) $tB_3^3(t) + (1-t)B_4^3(t)$ d) $tB_2^3(t) + (1-t)B_3^3(t)$
 e) $tB_3^2(t) + (1-t)B_4^2(t)$

Correct Answer: $tB_2^3(t) + (1-t)B_3^3(t)$ 3. If $p(t) = (1-t)^2 + 2(1-t)t + t^2$, then which of the following statements are True?

- i) $p(t)$ is constant
 ii) $p(t) = a_0 + a_1t + a_2t^2$ for some constants a_0, a_1, a_2
 iii) $p(t) \in P_1$
 a) i) only b) ii) only c) iii) only d) i) and ii) only e) all of them

Correct Answer: all of them

4. If $p(t) = 2(1-t)t + t^2$, then which of the following statements are True?

- i) $p(t) = C_1^2(t)$
 ii) $p(t) = a_0 + a_1t + a_2t^2$ for some constants a_0, a_1, a_2
 iii) $p(t) \in P_1$
 a) i) only b) ii) only c) iii) only d) i) and ii) only e) all of them

Correct Answer: i) and ii) only

5. Find the value of the Vandermonde or Confluent Vandermonde determinant: $\begin{vmatrix} 1 & 2 & 2^2 \\ 1 & 4 & 4^2 \\ 1 & 5 & 5^2 \end{vmatrix}$

- a) -6 b) 9 c) 2 d) 6 e) -2

Correct Answer: 6 6. Find the value of the Vandermonde or Confluent Vandermonde determinant: $\begin{vmatrix} 1 & 4 & 4^2 & 4^3 & 4^4 \\ 0 & 1 & 2 * 4 & 3 * 4^2 & 4 * 4^3 \\ 0 & 0 & 2 & 6 * 4 & 12 * 4^2 \\ 0 & 0 & 0 & 6 & 24 * 4 \\ 1 & 5 & 5^2 & 5^3 & 5^4 \end{vmatrix}$

- a) -12 b) 9 c) 6 d) 12 e) -6

Correct Answer: 12 7. By the linearity property of determinants with respect to one row or column, $\begin{vmatrix} 1 & 2 & 4 \\ -2 & -4 & -6 \\ 3 & 6 & 9 \end{vmatrix}$ is equivalent to:

- a) $-2 \begin{vmatrix} 1 & 2 & 4 \\ 1 & 2 & 3 \\ 3 & 6 & 9 \end{vmatrix}$ b) $-2 \begin{vmatrix} 1 & -1 & 4 \\ 1 & 2 & 3 \\ 3 & -3 & 9 \end{vmatrix}$ c) $3 \begin{vmatrix} 1 & 2 & 4 \\ 1 & 2 & 3 \\ 1 & 2 & 3 \end{vmatrix}$ d) $2 \begin{vmatrix} 1 & 2 & 4 \\ -2 & -4 & -6 \\ 3 & 3 & 3 \end{vmatrix}$ e) $2 \begin{vmatrix} 1 & 1 & 4 \\ -2 & 1 & -6 \\ 3 & 1 & 9 \end{vmatrix}$

Correct Answer: $-2 \begin{vmatrix} 1 & 2 & 4 \\ 1 & 2 & 3 \\ 3 & 6 & 9 \end{vmatrix}$

8. The polynomial $p(x) = \begin{vmatrix} 1 & x & x^2 \\ 1 & 3 & 9 \\ 1 & 5 & 25 \end{vmatrix}$ has zeros at x equal to:

- a) 3 and 2 b) 1 and 3 c) 1 and 5 d) 3 and 9 e) 3 and 5

Correct Answer: 3 and 5

9. Same $p(x)$ as in the previous question. The leading coefficient of $p(x)$ is:

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

Correct Answer: 2

10. Same $p(x)$ as in the previous question. The constant term of $p(x)$ is:

- a) 40 b) 50 c) 10 d) 20 e) 30

Correct Answer: 30