

MAT 300/500

Quiz 2

Spring 2019

1. Use a simple observation (about the graph) to find the interpolating polynomial in P_2 that passes through the points $(1, 2)$, $(2, 1)$, and $(4, -1)$. In the standard basis, with $p(t) = a_0 + a_1t + a_2t^2$, what is the coefficient a_2 ?
- a) -1 b) $-\frac{1}{2}$ c) $\frac{1}{2}$ d) 1 e) 0

Correct Answer: 0

2. Same $p(t)$ as in the previous question. What is the coefficient a_1 ?
- a) -1 b) $-\frac{1}{2}$ c) $\frac{1}{2}$ d) 1 e) 0

Correct Answer: -1

3. Compute the divided difference $[0, 1, 2]g$ if $g(0) = 2$, $g(1) = -1$ and $g(2) = 0$.
- a) -1 b) $-\frac{1}{2}$ c) $\frac{1}{2}$ d) 1 e) 2

Correct Answer: 2

4. If $p(t)$ is the interpolating polynomial which passes through the points $(0, 2)$, $(1, -1)$, and $(2, 0)$, what is the coefficient of t^2 in $p(t)$?
- a) -1 b) $-\frac{1}{2}$ c) $\frac{1}{2}$ d) 1 e) 2

Correct Answer: 2

5. To show the existence and uniqueness of the interpolating polynomial $p(t) = a_0 + a_1t + a_2t^2 + \dots + a_d t^d$, for a data sequence t_0, \dots, t_d , and data function $g(t)$, with y -values $y_i = g(t_i)$, using the standard basis, we used a linear system $A\mathbf{x} = \mathbf{b}$. The appropriate entries of the column vector \mathbf{x} are:

- a) a_0, \dots, a_d b) t_0, \dots, t_d c) y_0, \dots, y_d d) $y_0 - t_0, \dots, y_d - t_d$ e) $\frac{a_1 - a_0}{t_1 - t_0}, \dots, \frac{a_d - a_{d-1}}{t_d - t_{d-1}}$

Correct Answer: a_0, \dots, a_d

6. Same $A\mathbf{x} = \mathbf{b}$ as in the previous question. The existence and uniqueness of $p(t)$ follows from: (assume $i = 0, \dots, d$)

- a) $\det(A) \neq 0$ b) $\det(A) = 0$ c) $g(t_i) = 0$ d) $g(t_i) \neq 0$ e) $t_i \neq 0$

Correct Answer: $\det(A) \neq 0$

7. Below is an interpolating polynomial written with Lagrange polynomials, that passes through the points: $(0, 2)$, $(1, 4)$, $(3, -3)$. Find the correct value of the missing constant C :

$$(2) \frac{(t-1)(t-3)}{(0-1)(0-3)} + (4) \frac{(t-0)(t-3)}{(1-0)(1-3)} + (-3) \frac{(t-0)(t-1)}{C}$$

- a) -12 b) -6 c) 12 d) 6 e) 3

Correct Answer: 6

8. Let $f(t) = 2(t-1)_+^1 - (t-2)_+^1$. Find $f(1)$:

- a) 3 b) 2 c) 1 d) 4 e) 0

Correct Answer: 0

9. Let $f(t) = 2(t-1)_+^1 - (t-2)_+^1$. Find $f(\frac{3}{2})$:

- a) 3 b) 2 c) 1 d) 4 e) 0

Correct Answer: 1

10. Solve for a_1 : $(t-2)(t-1)_+^1 = a_1(t-1)_+^1 + a_2(t-1)_+^2$.

- a) 1 b) 2 c) -1 d) -2 e) 0

Correct Answer: -1