MA 214: Introduction to numerical analysis (2021–2022)

Quiz 1, grading scheme

(February 02, 2022)

(1) Use 4-digit rounding method to compute: $\dfrac{1}{10\mathsf{V}+\mathsf{W}} + \dfrac{4\mathsf{T}^2}{\mathsf{U}^2+13}$. [2 marks]

If your set $\{\mathsf{T},\mathsf{U},\mathsf{V},\mathsf{W}\}$ is incorrect then you get 0 marks.

If you have computed each of the two summands using the 4-digit rounding method and then applied the sum, or if you computed the sum as a rational number and then applied the 4-digit rounding method you get 2 marks for the correct answer.

If only one of the two values from $\{0.d_1d_2d_3d_4, e\}$ is correct then you get 1 mark.

(2) Consider the cubic polynomial $X^3 + \mathsf{T}X^2 + \mathsf{V}X + \mathsf{UW}$. Use the bisection method to compute an approximate root of the cubic. Mention your initial interval $[a,b]$ and compute the approximate root within a distance of $\frac{|b-a|}{16}$ of the actual root. [2 marks]

If your set $\{\mathsf{T},\mathsf{U},\mathsf{V},\mathsf{W}\}$ is incorrect then you get 0 marks.

If the bisection method is not applicable to your interval $[a,b]$ then you get 0 marks.

The question asked for only the 4-th approximation, however if you have computed a further approximation and got the answer within the required range, you get 2 marks.

(3) Consider the equation: $\mathsf{W}\sin x - \mathsf{V}x = 0$. Towards computing the **non-zero** root of the equation, use the Newton-Raphson method with $p_0 = \frac{3\pi}{4}$ and compute p_3. [3 marks]

If your values $\mathsf{V} < \mathsf{W}$ are incorrect then you get 0 marks.

The question asked explicitly for p_3. If you computed any other p_n then you do not get any marks.

The correct answer gets 3 marks.

(4) Let P_3 denote the degree 3 polynomial interpolating the given data. Find $P_3(1.5)$. [3 marks]

x	0	1	2	3
$f(x)$	T	U	$\mathsf{U}+\mathsf{V}$	$\mathsf{U}+\mathsf{W}$

If your set $\{\mathsf{T},\mathsf{U},\mathsf{V},\mathsf{W}\}$ is incorrect then you get 0 marks.

The correct answer gets 3 marks.

Your marks will be circulated in 2-3 days in Google classroom. If you have any query, contact your TA first. If the TA thinks that the query is reasonable then (s)he will forward it to me.

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