King Saud University
Department of Mathematics
1st Semester 1433-1434 H

MATH 253-MATH 352 (Numerical Analysis)
1st Midterm Exam
Duration: 90 Minutes

Student's Name	Student's ID	Group No.	Lecturer's Name

Question No.	I	II	III	Total
Mark				

[**I**] Determine whether the following is **True** or **False**. **Justify** your answer.

(1) $p^* = 3.141$ approximates π to four significant digits. ( )

(2) The sequence $\alpha_n = \frac{2n^2+4n}{(n+1)^2}$ satisfies that $\alpha_n = 2 + O\left(\frac{1}{n^2}\right)$. ( )

(3) The minimum number of iterations needed to solve $cosx - x = 0$ on $\left[0, \frac{\pi}{4}\right]$ using the Bisection method with accuracy 10^{-4} is 13. ( )

(4) For $g(x) = \sqrt{\frac{5}{x+2}}$ on $[1, 2]$, the convergence of $p_n = g(p_{n-1})$ is guaranteed. ( )

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(5) 1 is a simple root of $f(x) = x^2 - 2x + 1$. ( )

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(6) The sequence $p_n = \frac{1}{e^n}$ converges linearly to zero. ( )

OVER

[II] Let $f(x) = x^3 - 20$. For $p_0 = 3.5$ and $p_1 = 2$,

(1) find p_2 using the secant method and compute the absolute error.

(2) find p_3 using the method of False Position and compute the relative error.

OVER

[III] Use Newton's method to find a root of $x^3 - 2x^2 - 2$ on $[2, 3]$ with accuracy 10^{-2}.

Good Luck