

Question No. I II IV Total Mark i i i i i I) Determine whether the following is True or False. Justify your answer. [4 Points] 1. If p^* approximates π to 3 significant digits, then $p^* \in [0.995\pi, 1.005\pi]$. (2. If $x = \frac{6}{7}$ and $y = \frac{2}{3}$ then the 4-digit rounding value of $x \ominus y$ is 0.1905. (3. If the growth of error for an algorithm is linear, then this algorithm is stable. (]	Group No.		Student's ID		Stud		Student's	
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[II] Let $\alpha_n = \frac{n+4}{(2n+1)^3}$ and $F(h) = \frac{1-e^h}{h}$. [4 Points]

- (a) **Determine** the rate of convergence for α_n .
- (b) **Determine** the rate of convergence for F(h).

[III] Let $f(x) = x^5 - 2x - 1$. [5 Points]

- (a) **Show** that f has a root in [1, 1.5].
- (b) Use the Bisection method to find the root of f on [1, 1.5] accurate to within 10^{-2} .
- (c) **Estimate** the relative error in (b).

[IV] [7 Points]

- A. Let $f(x) = x^3 x^2 3$.
 - (i) If f(p) = 0, show that each of the functions $g_1(x) = \sqrt[3]{3+x^2}$ and $g_2(x) = \frac{3}{x^2} + 1$ has a fixed point at p.
 - (ii) Which of the functions g_1 and g_2 in (i) is better for the fixed-point iterations on [1, 2]? Justify your answer.

B. Use an appropriate fixed-point iteration to find the root of $\pi + \frac{1}{2}\sin(\frac{x}{2}) - x$ on $[0, 2\pi]$ with accuracy 10^{-3} .