



TOBB-ETÜ, MATEMATİK BÖLÜMÜ
MAT-395 MESLEKİ İNGİLİZCE I (Sayısal Analiz)
ÖRNEK SINAV

Adı Soyadı:

Numarası:

NOT: Sınav süresi 100 dakikadır.

1. Prob	2. Prob	3. Prob	4. Prob	TOPLAM

1. For the integral

$$\int_0^1 \frac{2}{2+x} dx$$

- (a) (12 pts) Calculate it by using the Simpson's rule for $n = 2$ where the exact value of the integral is 0.8109302.
- (b) (6 pts) Give a rigorous error bound for $I - S_2$.
- (c) (6 pts) Compute the asymptotic error estimate over the interval $[0, 1]$.
- (d) (6 pts) How can you improve the numerical integration of this problem? Calculate your improved result!

2. For the following function

$$f(x) = x^2 - 2$$

- (a) (15 pts) Find the root of it in $[0, 3]$ by using Secant method by taking $x_0 = 3$ ve $x_1 = 0$.
 - (b) (5 pts) Give an estimate to the error.
3. (25 pts) Find a linear least square approximation to the function $f(x) = e^x$ over the interval $[0, 1]$.
4. True or False? To get any credit, you must give some justification for your answer.

- (a) (12 pts) If a sufficiently accurate initial guess x_0 is given, then the iteration $x_{n+1} = \frac{2}{3}x_n + \frac{1}{3x_n^2}$ converges to $\alpha = 1$ with order of convergence 3. (Hint: Use the higher deravite test!)
- (b) (13 pts) Consider comparing two iteration methods called A and B . Suppose we want to solve $f(x) = 0$ and we want to have our final iterates x_n satisfy the error tolerance $|\alpha - x_n| < \varepsilon$. If the method A requires the calculation of fewer iterates than the method B , then the method A is better than the method B .)