

Computer Sciences for Engineers

Sample test

Name:.....

NEPTUN:

1.)	2.)	3.)	4.)	5.)
a	a	a	a	a
b	b	b	b	b
c	c	c	c	c

1.) Approximate the root of the function $f(x) = e^{(x^2)} - 3x^3$ ($x \in [0.6, 1.2]$) with interval halving method in 4 steps!

- a) $x \approx 0.5$
- b) $x \approx 2$
- c) $x \approx 0.9375$

10 points

2.) Approximate the minimum point of the function $f(x) = e^{(x^2)} - 3x^3$ ($x \in [0.5, 1.8]$) with Finonacci search when the number of subintervals is $F_6 = 13$.

- a) $x \approx 1$
- b) $x \approx 1.3$
- c) $x \approx 1.5$

10 points

3.) Approximate the value of the integral

$$\int_{-1}^2 e^{(x^2)} - 3x^3$$

with Simpson's rule when the number of subintervals is $n = 12$.

- a) $x \approx 10.128$
- b) $x \approx 1.2$
- c) $x \approx -2.128$

10 points

4.) Determine the coefficients of the function $f(x) = a_1 + a_2 \cdot e^x + a_3 \cdot x^2$ with least squares method and approximate the value of $f(4)$ if

x	-1	2	3	5
f(x)	-1	-3	-5	75

a) $a_1 = 1.5205, a_2 = 0.9899, a_3 = -2.9374, f(4) \approx 6.5422$

b) $a_1 = 1.5205, a_2 = 1.9899, a_3 = -2.9374, f(4) \approx 63.167$

c) $a_1 = 1.5205, a_2 = 0.9899, a_3 = -2.9374, f(4) \approx 8.5688$

10 points

5.) Determine the Lagrange interpolation polynomial and approximate the value of $f(4)$ if

x	-1	2	3	5
f(x)	-1	-3	-5	75

a) $p(x) = 2.3889 x^3 - 9.8889 x^2 + 2.0556 x + 13.333, f(4) \approx 16.222$

b) $p(x) = 2 x^3 - 10 x^2 + 2 x + 13, f(4) \approx 16$

c) $p(x) = -x^3 + 2 x^2 + 3 x - 1, f(4) \approx -21$

10 points