King Fahd University of Petroleum and Minerals
Information Technology Center
Computing Services Section

Dept. of: Math
Course: math371 First Maior Exam
Semester: 242

Thursday, February 20, 2025

			Raw Score	% Score
Total no. of Students:	54	**Course Mean:**	57.69	82.41
Course Std. Dev. :	13.55	**Max. Score:**	70	100
		Min. Score:	5	7.14

Average (%) of each question

1.0000	92.5926
2.0000	85.1852
3.0000	83.3333
4.0000	81.4815
5.0000	85.1852
6.0000	62.9630
7.0000	66.6667
8.0000	87.0370
9.0000	90.7407
10.0000	85.1852
11.0000	75.9259
12.0000	87.0370
13.0000	90.7407
14.0000	79.6296

Question with highest average
Q1

Question with lowest average
Q6 and Q7

King Fahd University of Petroleum and Minerals
Department of Mathematics

Math 371

Major Exam I

242

February 19 , 2025

Net Time Allowed: 90 Minutes

USE THIS AS A TEMPLATE

Write your questions, once you are satisfied upload this file.

1. If the second Taylor polynomial $P_2(x)$ approximates $f(x) = e^x \cos(x)$ about $x_0 = 0$, then $P_2(0.5) =$

   (a) 1.5
   (b) 1.1
   (c) 1.2
   (d) 1.3
   (e) 1.4

no students = 54
Average = 92.5926 %

2. If the second Taylor polynomial $P_2(x)$ approximates $f(x) = x \ln(x)$ about $x_0 = 1$, then the least upper bound for $|f(0.6) - P_2(0.6)|$ is

   (a) 0.0296
   (b) 0.0207
   (c) 0.0319
   (d) 0.0374
   (e) 0.0109

no students = 54
Average = 85.1852 %

3. The result of $-10\pi + 6e - \frac{3}{62}$ using three-digit rounding arithmetic is

(a) -15.1
(b) -15.0
(c) -14.9
(d) -14.8
(e) -15.2

no students = 54
Average = 83.3333 %

4. Suppose p^* must approximate $p = 900$ with relative error at most 10^{-3}. Then the largest interval in which p^* must lie is

(a) (899.1, 900.9)
(b) (898.9, 899.8)
(c) (899.3, 900.5)
(d) (898.5, 899.7)
(e) (899.4, 901.2)

no students = 54
Average = 81.4815 %

5. Using the Bisection method to approximate the zero of $f(x) = \sqrt{x} - \cos(x)$ on $[0,\ 1]$, then $p_3 =$

(a) 0.625
(b) 0.601
(c) 0.592
(d) 0.571
(e) 0.639

no students = 54
Average = 85.1852 %

6. The function $g(x) = \pi + 0.5 \sin(\frac{x}{2})$ has a unique fixed point on $[0, 2\pi]$. Using $p_0 = \pi$, the minimum number of iterations required to achieve 10^{-5} accuracy by fixed point iteration method is

(a) 10
(b) 9
(c) 11
(d) 12
(e) 13

no students = 54
Average = 62.9630 %

7. The equation $4x^2 - e^x - e^{-x} = 0$ has two positive solutions. Use Newton's method with $p_0 = 0.5$ to find solution accurate to within 10^{-1}:

(a) 0.82937

(b) 0.82449

(c) 0.81212

(d) 0.81111

(e) 0.81333

no students = 54
Average = 66.6667 %

8. Let $f(x) = -x^3 - \cos(x)$. If the root of f is approximated by the Secant method with $p_0 = -1$ and $p_1 = 0$, then $p_3 =$

(a) -1.2521

(b) -0.2529

(c) -1.6247

(d) -0.8791

(e) -0.7666

no students = 54
Average = 87.0370 %

9. Let $P_2(x)$ be the second Lagrange polynomial for $f(x) = \sqrt{1+x}$ using the nodes $x_0 = 0$, $x_1 = 0.6$, and $x_2 = 0.9$. Then $P_2(0.45) =$

(a) 1.2034

(b) 1.3057

(c) 1.1052

(d) 1.2901

(e) 1.3765

no students = 54
Average = 90.7407 %

10. Let $P_3(x)$ be the third Lagrange polynomial for the data (0,0), (0.5, b), (1, 3), and (2, 2). If the coefficient of x^3 in $P_3(x)$ is 6, then $b =$

(a) 4.25

(b) 3.75

(c) 3.15

(d) 4.85

(e) 5.35

no students = 54
Average = 85.1852 %

11. A clamped cubic spline S for a function f is defined on $[1, 3]$ by

$$\begin{cases} S_0(x) = 3(x-1) + 2(x-1)^2 - (x-1)^3, & 1 \le x < 2, \\ S_1(x) = a + b(x-2) + c(x-2)^2 + \frac{1}{3}(x-2)^3, & 2 \le x \le 3. \end{cases}$$

Given that $f'(1) = f'(3)$, then $a + b + 9c =$

(a) -1

(b) 2

(c) -5

(d) 8

(e) 0

no students = 54
Average = 75.9259 %

12. Consider the data in the given table. Using the most accurate three-point formula, $f'(1.1) \approx$

x	1.1	1.2	1.3
$f(x)$	9.025013	11.02318	13.46374

(a) 17.769705

(b) 22.193635

(c) 27.107350

(d) 32.150850

(e) 13.4626128

no students = 54
Average = 87.0370 %

13. Suppose that $f(0) = 1$, $f(0.25) = 2.5$, $f(0.5) = a$, $f(0.75) = -6.5$, and $f(1) = 2$. If the Composite Simpson's rule with $n = 4$ gives the value 2 for $\int_0^1 f(x)dx$, then $a =$

(a) 18.5

(b) 16.4

(c) 21.3

(d) 23.4

(e) 25.7

no students = 54
Average = 90.7407 %

14. The smallest value of n required to approximate $\int_0^2 \frac{1}{x+4}dx$ to within 10^{-5} using Composite Trapezoidal rule is

(a) 46

(b) 51

(c) 57

(d) 40

(e) 38

no students = 54
Average = 79.6296 %