



Sino Bright School Chongqing

examtitle

Subject: subject

Date: examdate

Time: duration

Teacher: teacher

IMPORTANT: Read together before beginning the exam.

Students must complete the assessments to the best of their ability. Any students found cheating during an exam will be given a zero and referred to the Principal for further disciplinary measures. Cheating is a serious offense.

"Cheating" may include any of the following:

- Having course papers, notes, unapproved data sheets or other course-related materials in the exam room without the express permission of the subject class teacher in charge of the exam.
- Using or even having a cellphone or other electronic device in the exam room without the express permission of the subject class teacher in charge of the exam.
- Attempting to communicate, either verbally or non-verbally with other students during the exam.
- Having exam-related materials prior to the writing of the exam.

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| Mark Breakdown: | Student Name: |
| Part 1: Multiple Choice Questions MCQ \times MCQNo | |
| Part 2: Short Answer Questions SAQ \times SAQNo | |
| Part 3: Long Answer Questions LAQ \times LAQNo | |
| Total Score: 100 | Score: _____ |

Special Instructions/Materials Allowed:

- Pen
- Calculator

Part I: Multiple Choice Questions ($5pts \times 10$)

1. If a root of $f(x) = 0$ lies in $[3, 4]$, what is the midpoint after the first iteration of interval bisection?
 - A) 3.25
 - B) 3.5
 - C) 3.75
 - D) 3.0
2. The formula for the first approximation x_1 using linear interpolation is:
 - A) $x_1 = a - \frac{f(a)(b-a)}{f(b)-f(a)}$
 - B) $x_1 = \frac{a+b}{2}$
 - C) $x_1 = a - \frac{f(a)}{f'(a)}$
 - D) $x_1 = \frac{f(b)-f(a)}{b-a}$
3. The directrix of the parabola $y^2 = 24x$ is:
 - A) $x = -6$
 - B) $x = 6$
 - C) $y = -6$
 - D) $y = 6$
4. The modulus of $z = 3 + 4i$ is:
 - A) 5
 - B) 7
 - C) 12
 - D) 25
5. The iteration formula is $x_{n+1} = x_n - \frac{f(x_n)}{f'(x_n)}$. What condition is critical for convergence?
 - A) $f'(x_n) \neq 0$
 - B) $f(x_n) > 0$
 - C) $f(x_n) < 0$
 - D) $f'(x_n) = 0$
6. If $z = 2 - 5i$, then $z + z^*$ equals:
 - A) 4
 - B) $-10i$
 - C) $4 - 10i$
 - D) 0
7. A root of a continuous function $f(x)$ exists in $[a, b]$ if:
 - A) $f(a)$ and $f(b)$ are positive
 - B) $f(a) \cdot f(b) < 0$
 - C) $f(a) = f(b)$
 - D) $f(a) \cdot f(b) > 0$
8. The Cartesian equation for $x = 2t$, $y = 4t^2$ is:
 - A) $y = x^2$
 - B) $y = 2x^2$
 - C) $y = \frac{x^2}{4}$
 - D) $y = 4x^2$



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9. The asymptotes of $xy = 9$ are:
- A) $x = 0$ and $y = 0$
 - B) $x = 3$ and $y = 3$
 - C) $x = 9$ and $y = 9$
 - D) None
10. If a quadratic equation has roots α and β , then $\alpha + \beta =$
- A) $\frac{b}{a}$
 - B) $-\frac{b}{a}$
 - C) $\frac{c}{a}$
 - D) $-\frac{c}{a}$

Part II: Short Answer Questions ($5pts \times 4$)

1. After 3 iterations of interval bisection on $[3, 4]$, the interval length is _____.
2. For $f(2) = -3$ and $f(4) = 5$, the next approximation using linear interpolation is _____.
3. The focus of the parabola $y^2 = 28x$ is at _____.
4. The argument of $z = -1 - i$ (in radians) is _____.

Part III: Long Answer Questions ($15pts \times 2$)

1. Let $z^6 = 1$.
 - (a) Find all the solutions to the equation.

- (b) Show each solution on an Argand diagram.

(c) Show that each solution lies on a circle with center $(0, 0)$ and radius 1.

2. Given the quadratic equation $x^2 - 5x + 6 = 0$ with roots α and β :

(a) Use Vieta's formulas to find $\alpha + \beta$ and $\alpha\beta$.

(b) Construct a new quadratic equation with roots 2α and 2β .

(c) Use the Newton-Raphson method with $x_0 = 3$ to approximate a root of the new equation. Perform 2 iterations and round your answers to 4 decimal places.