**First Midterm Exam**
**Academic Year 1443-1444 Hijri- First Semester**

| Exam Information معلومات الامتحان | | | |
|---|---|---|---|
| **Course name** | **Integral Calculus** | | اسم المقرر |
| **Course Code** | **Math111 ريض 111** | | رمز المقرر |
| **Exam Date** | **2023-10-04** | **1445-03-19** | تاريخ الامتحان |
| **Exam Time** | **03: 00  PM** | | وقت الامتحان |
| **Exam Duration** | 2 hours | ساعتان | مدة الامتحان |
| **Classroom No.** | | | رقم قاعة الاختبار |
| **Instructor Name** | **حنان العوهلي** | | اسم استاذ المقرر |

| Student Information معلومات الطالب | | |
|---|---|---|
| **Student's Name** | | اسم الطالب |
| **ID number** | | الرقم الجامعي |
| **Section No.** | | رقم الشعبة |
| **Serial Number** | | الرقم التسلسلي |

**General Instructions:**

تعليمات عامة:

- Your Exam consists of ☐ 6 PAGES (except this paper)
- Keep your mobile and smart watch out of the classroom.
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- عدد صفحات الامتحان ☐ 6 صفحة. (بإستثناء هذه الورقة)
- يجب إبقاء الهواتف والساعات الذكية خارج قاعة الامتحان.
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**هذا الجزء خاص بأستاذ المادة**
*This section is ONLY for instructor*

| # | Course Learning Outcomes (CLOs) | Related Question (s) | Points | Final Score |
|---|---|---|---|---|
| 1 | CLO 2.1 | QV | 4 | |
| 2 | CLO 2.2 | QI+QII+QIV | 5+5+3 | |
| 3 | CLO 2.4 | QIII | 8 | |
| 4 | | | | |
| 5 | | | | |
| 6 | | | | |
| 7 | | | | |
| 8 | | | | |

EXAM COVER PAGE

| Question | Mark |
|---|---|
| | |
| Question I | |
| Question II | |
| Question III | |
| Question IV | |
| Question V | |
| Total | |

**Question I:** (5 points)

| Question Number | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| Answer | | | | | |

A. Choose the correct answer, then fill in the table above:

(1) If $f(x) = 4x^3 + \cos x$, then the most general antiderivative of $f$ is

(a) $x^4 + \sin x + C$          (b) $12x^4 + \sin x + C$

(c) $12x^2 + \sec x + C$          (d) None of the previous

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(2) If $\int_1^3 f(x)dx = 5$, $\int_3^1 g(x)dx = 2$, then $\int_1^3 [3f(x) + g(x)]dx =$

(a)3          (b) 17          (c) 13          (d) None of the previous

(3) $\sum_{k=1}^{5}(k - \alpha) = 7$, then the value of $\alpha$ is

(a) $\frac{22}{5}$          (b)$\frac{8}{5}$          (c) $\frac{12}{5}$          (d) None of the previous

(4) If $F(x) = \int_{1}^{3x^2+1} \tan t \, dt$, then $F'(x) =$

(a) $\tan(3x^2 + 1)$          (b)$6x \sec^2(3x^2 + 1)$

(c) $6x \tan(3x^2 + 1)$          (d) None of the previous

(5) $\int D_x[x^5 \sin^3 x]dx =$

(a) $\frac{1}{6}x^6 \cos^3 x + C$          (b)$x^5 \sin^3 x$

(c) $x^5 \sin^3 x + C$          (d) None of the previous

**Question II:** (2+3 points)

A. Without solving the integral prove that

$$\int_0^2 (x^2 + 5)dx \le \int_0^2 (x + 7)dx.$$

B. Find the value of $z$ that satisfies the conclusion of the Integral Mean Value Theorem for $f(x) = x^3$

on $[2,4]$.

**Question III:** (4+4 points)

A. Sketch the region R bounded by the graphs of the functions $y = x^2$, $y = 8 - x^2$ and then **find its area.**

B. Let R be the region bounded by the graphs of $y = \sqrt{x}$, $y = 3$ and y-axis. **Sketch the region R** and **set up the integral** for the volume of the solid resulting by revolving R about

(i) The x-axis.                    (ii) The y-axis.

Find the area under the curve $f(x) = 3x^2 + 1$ on $[0,4]$, by taking the limit of the Riemann sum and the right-handed endpoints.

**Question V:** (4 points)

Evaluate the following integrals:

(i) $\int_1^3 |x - 2| \, dx$

(ii) $\int \frac{(\sqrt{x}+3)^4}{\sqrt{x}} \, dx$

Good Luck☺