College of Science.
Department of Mathematics

كلية العلوم
قسم الرياضيات

King Saud University
جــــامــــعــــة الملك سعود

Final Exam
Academic Year 1444-1445 Hijri- First Semester

معلومات الامتحان Exam Information		
Course name	**Integral Calculus**	اسم المقرر
Course Code	**Math 111 ريض 111**	رمز المقرر
Exam Date	**2023-12-13** | **1445-05-29**	تاريخ الامتحان
Exam Time	**08: 00 AM**	وقت الامتحان
Exam Duration	3 hours | ثلاث ساعات	مدة الامتحان
Classroom No.	**G043**	رقم قاعة الاختبار
Instructor Name	**حنان العوهلي**	اسم استاذ المقرر

معلومات الطالب Student Information		
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 8 PAGES (except this paper)
- Keep your mobile and smart watch out of the classroom.
-

- عدد صفحات الامتحان 8 صفحة. (بإستثناء هذه الورقة)
- يجب إبقاء الهواتف والساعات الذكية خارج قاعة الامتحان.
-

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	QII	14	
2	CLO 2.2	QI	7	
3	CLO 2.3	QIII	4	
4	CLO 2.4	QIV+V	15	
5				
6				40
7				
8				

EXAM COVER PAGE

Question Number	I	II	III	IV	V	Total
Mark						

Question I:

A. Find the value of z that satisfies the conclusion of the Integral Mean Value Theorem for $f(x) = (x - 1)^2 on$ $[1,4]$. [3 points]

_____

B. If $F(x) = \int_{ln|x|}^{e^x} \sqrt{t^2 + 5}\, dt$ then compute $F'(x)$. [2 points]

_____

C. Compute $f'(x)$ if

$$f(x) = sinh^{-1}(3^x) + ln\left(|tanh(4x)|\right)$$ [2 points]

Question II:

Evaluate the following integrals:

1. $\int \dfrac{2}{\sqrt{-x^2-6x}}\, dx$ [3 points]

2. $\int x^2 \cosh x\, dx$ [3 points]

3. $\int \dfrac{1}{x^2\,\sqrt{x^2-4}}\, dx$ [3 points]

4. $\int \dfrac{4x^2-x+12}{x^3+4x}\, dx$ [3 points]

5. $\int \dfrac{1}{\sqrt{x}+\sqrt[3]{x}}\, dx$ [2 points]

Question III:

A. Compute the following limit

$$\lim_{x \to \infty} \frac{e^x + 5x}{e^{2x} + 2x + 1} \,.$$ [2 points]

B. Determine whether the improper integral $\int_1^\infty \frac{1}{(2x-1)^3} \, dx$ converges or diverges. If it

converges find its value. [2 points]

Question IV:

A. Sketch the region R bounded by the graphs of the functions

$y = -x^2, \; y = x^2 + 1, x = -1 \; and \; x = 2.$

Then **find its area.** [3 points]

B. Sketch the region R bounded by the graphs of
$$y = x^2 \ and \ y = \sqrt{x}.$$
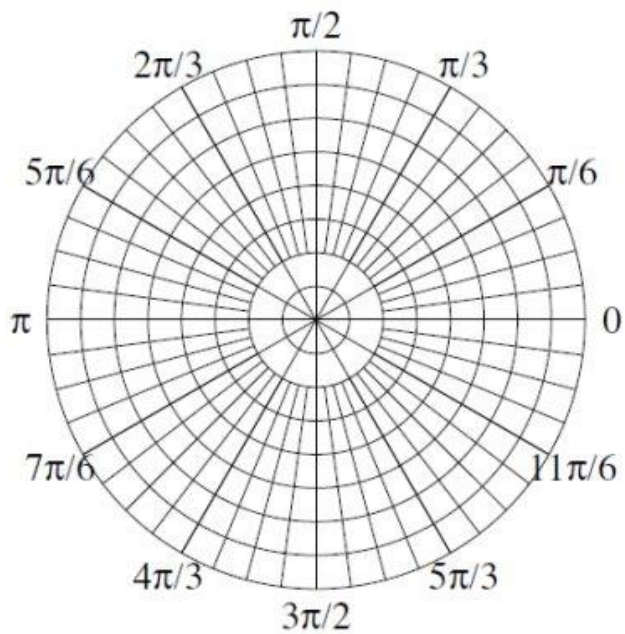Then **find the volume** of the solid generated by revolving R about the $x - axis.$ [3 points]

C. Find the arc length of the graph of $y = 2 + \cosh(x)$ from $x = 0$ to $x = \ln 2$.   [3 points]

Question V:

A. Find an equation in x and y that has the same graph as the polar equation   [2 points]
$$r = 8\cos\theta + 6\sin\theta.$$

B. <u>**Sketch**</u> the region inside graph of the polar equation $r = 3 + 3\cos\theta$ and outside the graph of the curve $r = 3$. Then <u>**compute its area**</u>.   [4 points]

π/2
2π/3   π/3
5π/6   π/6
π   0
7π/6   11π/6
4π/3   5π/3
3π/2