Kingdom of Saudi Arabia
Ministry of Education
Jazan University
Faculty of Science
Mathematics Department

المملكة العربية السعودية
وزارة التـــعليـــم
جامـــعة جـــــازان
كليـة العـــلوم
قسم الرياضيات

Final Exam for The Second Semester 2024

الإختبار النهائي للفصل الدراسي الثاني من العام الجامعي ١٤٤٥

										الرقم الجامعي Student's ID			اسم الطالب / ـة Student's Name
		رقم القاعة Room No			الشعبة Group	Math-211	رمز المقرر Course Code	تفاضل وتكامل١ Calculus1			اسم المقرر Course Name		
إلى To		من From		وقت الاختبار Exam Duration			13/02/2024	التاريخ Date	Tuesday		اليوم Day		
10:00 a.m		08:00 a.m											
5		عدد صفحات الإختبار بدون الغلاف Number of Pages Without Cover Page								رقم التسلسل Serial Number			

Domains Percentages (%)			
Learning Domains	**Percentage in the course**	**Percentage in the Final Exam**	**Marks in the Final Exam**
Knowledge & Understanding	30	40%	20
Skills	60	60%	30
Values	10		
Total	**100**	**100%**	**50**

Final Exam			
Question No	**(CLOs)**	**Mark**	**Student Mark**
1	**K&U (CLO 1.1)**	**6**	
	K&U (CLO 1.2)	**6**	
	K&U (CLO 1.3)	**8**	
2	**S (CLO 2.1)**	**5**	
3	**S (CLO 2.2)**	**6**	
4	**S (CLO 2.3)**	**10**	
5	**S (CLO 2.4)**	**9**	
Total		**50**	

Marks Distribution	**Semester Activities**		**Total Semester Activities Marks**	**Final Exam Marks**	**Total Marks**
	Activities Marks	**Lab. Marks**			
	____	____	____	____	____

Course Instructor	_____	**Reviewer**	_____
Signature	_____	**Signature**	_____

Vice-Deanship for Research & Development
Learning and Education Unit
Form 011

وكالة الكلية للبحث و التطوير
وحدة التعليم و التعلم
نموذج ٠١١

K1(1-6), K2(7-12) **Answer the following questions:** **(Marks: 12)**

Question1. Choose the correct answer.

(1) The formula $\sin 2x =$

(A) $2\sin x$ (B) $2\sin x\cos x$ (C) $\sin x\cos x$ (D) $2\cos x$

(2) The domain of $f(x) = \dfrac{4}{\sqrt{4-x}}$ is

(A) $[4,\infty)$ (B) $(4,\infty)$ (C) $(-\infty,4)$ (D) $(-\infty,4]$

(3) If $f(x) = x^3 + \dfrac{1}{x^{-2}} + \ln(2x^2)$. Find $f''(1)$

(A) 2 (B) 7 (C) 4 (D) 6

(4) $\lim\limits_{x\longrightarrow 0} \dfrac{x+2}{5x-2}$

(A) 0 (B) -1 (C) 1 (D) 2

(5) $\dfrac{d}{dx}[e^{\sin\sqrt{x}}] =$

(A) $\dfrac{\cos\sqrt{x}}{2\sqrt{x}}e^{\sin\sqrt{x}}$ (B) $-\dfrac{\cos\sqrt{x}}{2\sqrt{x}}e^{\sin\sqrt{x}}$ (C) $-\cos\sqrt{x}e^{\sin\sqrt{x}}$ (D) $\cos\sqrt{x}e^{\sin\sqrt{x}}$

(6) If $e^{(3x-1)} = 5$. Find the value of x

(A) $\dfrac{\ln 5 - 1}{3}$ (B) $\ln 5 - 3$ (C) $\dfrac{\ln 5 + 1}{3}$ (D) $\ln 5 + 3$

(7) The function $f(x) = \dfrac{1}{x^2}$ is discontinues at $x =$

(A) 1 (B) ∞ (C) 0 (D) -1

(8) $\lim\limits_{x\longrightarrow\infty} \dfrac{3x+2}{x-1}$

(A) 3 (B) 2 (C) -2 (D) ∞

(9) $\lim\limits_{x\longrightarrow 0} \dfrac{\sin 3x}{x}$

(A) 0 (B) 3 (C) 1 (D) ∞

(10) If $\Theta = \cos^{-1}\left(\dfrac{1}{2}\right)$, then $\tan\Theta =$

(A) $\dfrac{\sqrt{3}}{2}$ (B) $\dfrac{1}{2}$ (C) $\dfrac{1}{\sqrt{3}}$ (D) $\sqrt{3}$

(11) $\dfrac{d}{dx}[2\tan^{-1}\sqrt{x}] =$

(A) $\dfrac{2}{\sqrt{x}(x+1)}$ (B) $\dfrac{1}{2\sqrt{x}(x+1)}$ (C) $\dfrac{\sqrt{x}}{(x+1)}$ (D) $\dfrac{1}{\sqrt{x}(x+1)}$

(12) If $\dfrac{d}{dx}[\sec 2x]$

(A) $-2\sec 2x\tan 2x$ (B) $2\sec 2x\tan 2x$ (C) $\sec x\tan x$ (D) $2\csc 2x\cot 2x$

K3. **(Marks: 8).**

(1.2) Let $f(x) = (x-1)^2 + 2, \quad g(x) = \sqrt{11 + 2x}$. Find the following.

(1.2.1) Find the domain of $f(x)$

Solution: ..... (Mark: 1)

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(1.2.2) $(g \circ f)(-1)$

Solution: ..... (Mark: 3)

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(1.2.3) Find the inverse $g^{-1}(x)$

Solution: ..... (Mark: 2)

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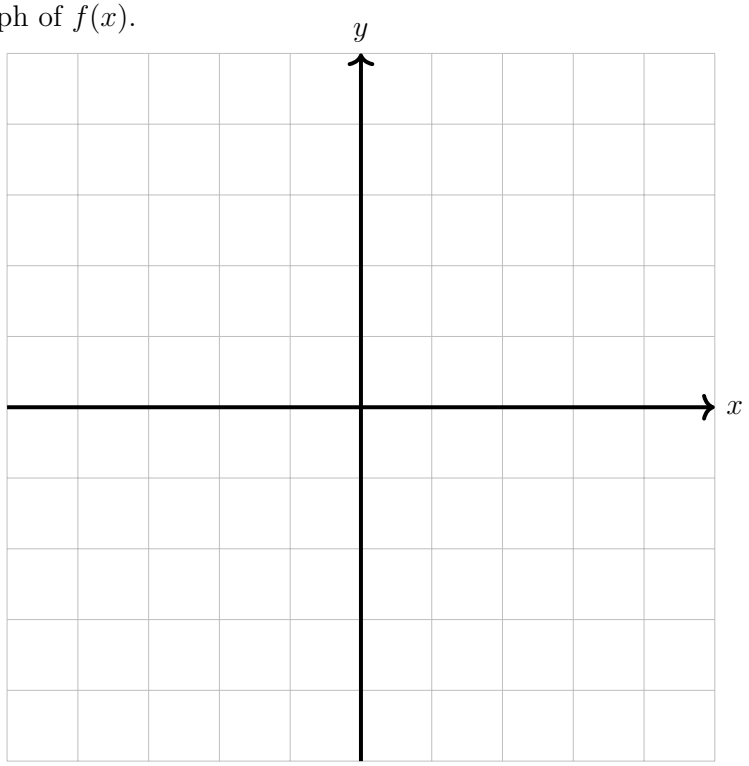
(1.2.4) Sketch the graph of $f(x)$.

Solution: (Mark: 2)



Question 2: **(S1. Mark: 5).**

(2.1) Show the given functions $f(x) = 3x^2 - 3$ is continuous on the intervals $[-1, 1]$.

Solution: ..... (Mark: 3)

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(2.2) $\lim_{x \longrightarrow 0} \dfrac{x^2}{\sqrt{x^2+4}-2}$

Solution..... (Mark: 2)

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Question 3: **(S2. Mark: 6)**

(3.1) Show that the function $f(x) = 2x^2 - x + 2$ satisfies the hypotheses of the Mean-Value Theorem over the interval $[-2, 0]$, and find the value of c that satisfy the conclusion of the theorem.

Solution: ..... (Mark: 3)

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(3.2) Find the intervals on which $f(x) = 2x^2 + 4x - 7$ is increasing and decreasing.

Solution: ..... (Marks: 3)

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Question 4: **(S3. Mark: 10)**

(4.1) Find the following derivatives.

Solution:

(4.1.1) $\frac{d}{dx}[x \cdot e^{-2x}] =$ ..... (Marks: 2)

(4.1.2) $\frac{d}{dx}[\tan 3x] =$ ..... (Marks: 2)

(4.1.3) $\frac{d}{dx}\left[\frac{1}{\sqrt{2x^2+5}}\right] =$ ..... (Marks: 2)

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(4.2) Find $\frac{dy}{dx}$ by implicit differentiation $x^2y^2 + x\sin y = 2$. (Marks: 2)

Solution: .....

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(4.3) Find the equations of the tangent line to the curve $f(x) = 3x^2 + 2x - 5$ at the point $(0, 1)$.

Solution: ..... (Marks: 2)

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Question 5: **(S4. Mark: 9)**

(5.1) Show that $\lim_{x \longrightarrow 0} x \sin\left(\frac{1}{x}\right) = 0$. (Marks: 3)

Solution:

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(5.2) Determine the value of x that make the given function $f(x) = \frac{2}{2x+1}$ discontinuous. (Marks: 1)

Solution:.....

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(5.3) Find the derivative of $f(x) = x^2 + x$ by the definition of derivative. (Marks: 3)

Solution:.....

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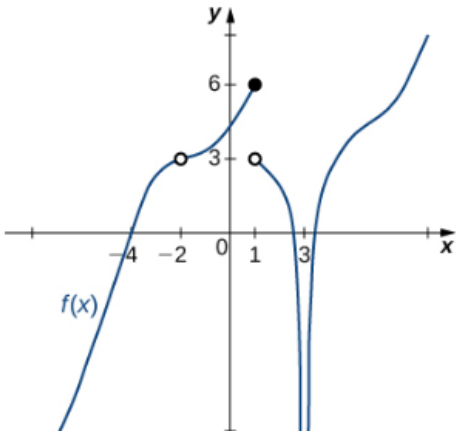
(5.4) From the graph of $f(x)$, evaluate the following. $\lim_{x \longrightarrow -2^-} [x^2 f(x)] + \lim_{x \longrightarrow 1^-} [2f(x)]$ (Marks: 2)



Solution: .....

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GOOD LUCK