Umm Al-Qura University **Final exam**

Faculty of Applied Science **Second semester1438/1439**

Department of Mathematical Sciences **Calculus(II) 2904102-4**

22-08-1439 **Time limit: 2 hours**

Student Name (Print):.....

Group (Print): .....ID (Print): .....

مسلسل كشف التوقيع:

This exam contains 6 pages (including this cover page) and 5 problems. Check to see if any pages are missing. Enter all requested information on the top of this page, and put your initials on the top of every page, in case the pages become separated.

You may *not* use your books, notes, or any calculator on this exam.

You are required to show your work on each problem on this exam. The following rules apply:

If you use a "fundamental theorem“ you must indicate this and explain why the theorem may be applied.
Organize your work, in a reasonably neat and coherent way, in the space provided. Work scat- tered all over the page without a clear ordering will receive very little credit.
Mysterious or unsupported answers will not receive full credit. A correct answer, unsup- ported by calculations, explanation, or algebraic work will receive no credit; an incorrect answer supported by substantially correct calculations and explanations might still receive partial credit.
If you need more space, use the back of the pages; clearly indicate when you have done this.

Do not write in this table		
Problem	Points	Score
1	12	
2	12	
3	10	
4	8	
5	8	
Total:	50	

Question 1(12 Marks)

Evaluate the following integrals using second fundamental theorem of calculus

a) $\int_2^4 3x^2 dx$

b) $\int_{-1}^2 (4x - 6x^2) dx$

c) $\int_{-1}^2 (x^{\frac{1}{3}} - x^{\frac{4}{3}}) dx$

d) $\int_0^x sin(t) dt$

Question 2(12 Marks):

Evaluate the following integrals using Substitution Rule determine each substitution term

a) $\int x \sin x^2 dx$

b) $\int x^3 \sqrt[3]{x^4 + 11} dx$

c) $\int \frac{\cos\sqrt{x}}{\sqrt{x}} dx$

Question 3(10 Marks):

a) (2 Marks)find the formula for f^{1} if:- $y = x / (1-x)$

b) (2 Marks) if $y= x^5 + 2x + 1$ find $f^{1}(4)$ using inverse function theorem

c) (6 Marks)find the differentiation of each of the functions

i) $\boldsymbol{y = \ln \sqrt{x}}$

ii) $y = x\, e^{x/2}$

iii) $\boldsymbol{y = 3^{\sqrt{x}}}$

iv) $\boldsymbol{y = \sin^{-1}(3x - 1)}$

v) $\boldsymbol{y = (\tan^{-1}(x))^3}$

vi) $\boldsymbol{y = (\mathrm{sech}^{-1}(x))}$

Question 4(8 Marks):

a) By parts, evaluate each of the following integrals:

$\int x^2 \sin x \, dx$

$\int_1^2 x\sqrt{x+1} \, dx$

b) Evaluate each of the following improper integrals:

$\int_{-\infty}^{1} xe^{-x^2}$

$\int_0^{\infty} \sin x$

Question 5(8 Marks):

a) (4 Marks) find the following limits

i) $\lim_{x\to 0} \frac{1-\cos x}{x^2+3x}$

ii) $\lim_{x\to \pi/2} (tanx . \ln sinx)$

b) (4 Marks) Find the Area of the region between the parabola $y^2 = 4x$ and the line $4x-3y = 4$