

Umm Al-Qura University
Faculty of Applied Science
Department of Mathematical Science
Saturday: 18 / 2 / 1440 H



First periodic exam
First semester 1439/1440 H
Math 4041101-4
Time Limit: $1\frac{1}{2}$ hours

Calculus(1): Differentiation and integration

Name (Print): _____

Group (Print): _____ ID (Print): _____

This exam contains 7 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 write your name 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 scattered 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, unsupported 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.

Problem	Points	Score
1	4	
2	4	
3	4	
4	4	
5	4	
Total:	20	

Do NOT write in the table to the right.

1. (4 points) Solve the following inequalities and express the solution on the real line:

(a) (2 points) $|2x - 7| < 3$

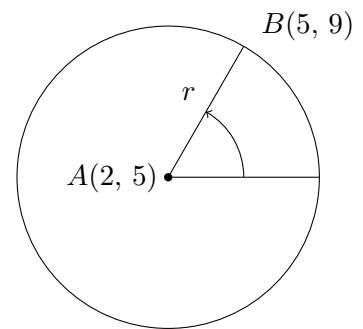
(b) (2 points) $x^2 + 2x - 3 \geq 0$

2. (4 points)

- (a) (2 points) Find the equation of the line that passes through the point $(3, -3)$ and parallel to the line $y = -\frac{2}{3}x + 2$.

(b) (2 points) In the given figure, **find**

- (i) the distance r between the points $A(2, 5)$ and $B(5, 9)$.



- (ii) the equation of the circle with centre $A(2, 5)$ and radius r .

3. (4 points)

(a) (2 points) Specify whether the given function is **odd**, **even** or **neither**

(i) $h(x) = x^3 + \sin x$

(ii) $g(x) = \frac{3x^6}{1+x^2}$.

(b) (2 points) Find the limit

$$\lim_{x \rightarrow 3^-} \frac{x^2 + 5}{x - 3}$$

4. (4 points)

(a) (2 points) Find the following limits:

(i) $\lim_{x \rightarrow -2} (x^2 - 2x + 5)$

(ii) $\lim_{x \rightarrow 3} \frac{x^2 - 2x - 3}{x - 3}$.

(b) (2 points) Show whether the function f , where $f(x) = \begin{cases} \frac{x^2-4}{x-2} & x \neq 2 \\ 2 & x = 2 \end{cases}$ is continuous at $x = 2$ or not?

5. (4 points)

(a) (2 points) Given that $f(x) = x - \frac{1}{x}$ and $g(x) = x^2 + 1$, **Find:**

(i) the natural domain of f

(ii) the natural domain of g

(iii) $(f + g)(2)$

(iv) $(f \circ g)(2)$

(b) (2 points) Sketch the graph of $f(x) = |x + 3| - 4$.

Best regards.