

ÇANKAYA UNIVERSITY

Department of Mathematics and Computer Science

**MCS 115 - Mathematics for Architects**

**FIRST MIDTERM EXAMINATION**

07.11.2014

**STUDENT NUMBER:**

**NAME-SURNAME:**

**SIGNATURE:**

**INSTRUCTOR:**

**DURATION:** 100 minutes

Question	Grade	Out of
1		10
2		15
3		20
4		15
5		10
6		15
7		15
Total		100

**IMPORTANT NOTES:**

- 1) Please make sure that you have written your student number and name above.
- 2) Check that the exam paper contains 7 problems.
- 3) Show all your work. No points will be given to correct answers without reasonable work.

- 1) Write an equation for the tangent line passes through  $(4, 10)$  and is perpendicular to the line  $6x - 3y = 5$ .

- 2) Find the domain of the function

$$f(x) = \log_2(4 - x^2) + \frac{\sqrt{x^2 - 3x}}{x + 1}$$

**3)** Sketch the graph of the function  $f(x) = \frac{2|x| - 3}{|x| - 1}$  by shifting the graph of  $g(x) = \frac{1}{x}$ .

4) Find the limit  $\lim_{x \rightarrow \infty} (\sqrt{x^2 + 5x + 1} - \sqrt{x^2 + 3x - 2})$ .

5) Find the limit  $\lim_{x \rightarrow 1} \frac{\sqrt{2x}(x-1)}{|x-1|}$ .

6) Find the limit  $\lim_{x \rightarrow 0} \frac{1 - \cos ax}{x(2-x) \tan bx}$

7) For what values of  $a$  and  $b$  is  $g(x)$  continuous everywhere?

$$g(x) = \begin{cases} ax + 2b, & x \leq 0 \\ x^2 + 3a - b, & 0 < x \leq 2 \\ 3x - 5, & x > 2 \end{cases}$$