ÇANKAYA UNIVERSITY

Department of Mathematics and Computer Science

MCS 115 - Mathematics for Architects

FINAL EXAMINATION
09.01.2015

STUDENT NUMBER:

NAME-SURNAME:

SIGNATURE:

INSTRUCTOR:

DURATION: 100 minutes

Question	Grade	Out of
1		20
2		20
3		20
4		15
5		30
Total		105

IMPORTANT NOTES:

1) Please make sure that you have written your student number and name above.

2) Check that the exam paper contains 5 problems.

3) Show all your work. No points will be given to correct answers without reasonable work.

1) Find the volume of the largest right circular cone that can be inscribed in a sphere of radius 3.

2) Evaluate the following limits.

a) $\lim_{x \to 2} \dfrac{x^2 - 4}{x^3 - 8}$

b) $\lim_{x \to 0} \dfrac{\cot 2x}{\csc x}$

3) Find y' if

a) $xy^4 + x^2y = x + 3y$

b) $y = \ln(x^2 + 1) + \sqrt{1 - 3x}$

4) a) Find a, b, c and d if $\begin{bmatrix} a+b & c+d \\ c-d & a-b \end{bmatrix} = \begin{bmatrix} 4 & 6 \\ 10 & 2 \end{bmatrix}^T$.

b) Compute the trace of each of the following matrices.

a) $\begin{bmatrix} 1 & 0 \\ 2 & 3 \end{bmatrix}$

b) $\begin{bmatrix} 2 & 2 & 3 \\ 2 & 4 & 4 \\ 3 & -2 & -5 \end{bmatrix}^T$

c) $\begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}^T$

5) Let $A = \begin{bmatrix} 1 & 0 & -1 \\ 2 & 1 & 1 \\ 3 & 1 & 0 \end{bmatrix}$ and $B = \begin{bmatrix} 0 & 0 & 1 \\ -1 & 1 & 1 \\ 2 & 0 & 1 \end{bmatrix}$. Compute each of the following.

a) A^3

b) $(AB)^2$