

**King Saud University**  
**College of Engineering in Alkharj**

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**Second Exam**  
**Semester II (1428/429)**

**Math 105**

**Date: 05-14-1429**

**Max. MARKS: 15**

**Time : 90min**

**Number of Pages :4**

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**NAME :** \_\_\_\_\_

**REG.NO :** \_\_\_\_\_

**GROUP :** \_\_\_\_\_

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<b>Exercise</b>	<b>Marks</b>
<b>1</b>	
<b>2</b>	
<b>3</b>	
<b>4</b>	
<b>5</b>	
<b>Total</b>	

**Exercise1 (3 degrees):**

Solve each equation for x.

<b>a)</b> $2\ln x^2 = 1$	<b>b)</b> $e^{2x-3} - 7 = 0$
<b>c)</b> $e^{2x} - 2e^x + 1 = 0$	<b>d)</b> $\ln x + \ln(x-1) = 1$
<b>e)</b> $e^{2x+1} - e^x = 0$	<b>f)</b> $\ln(5-2x) = -3$

**Exercise2 (3 degrees):**

- Prove that  $\sin(\tan^{-1} x) = \frac{x}{\sqrt{1+x^2}}$  where  $\tan^{-1} = \arctan$  is the inverse function of  $\tan$

- Prove that  $\sin(\cos^{-1} x) = \sqrt{1-x^2}$  where  $\cos^{-1} = \arccos$  is the inverse function of  $\cos$ .

**Exercise3 (3 degrees):**

Determine whether  $f$  is even, odd, or neither even nor odd.

- $f(x) = -3x^2 + 2$

- $f(x) = \frac{x^3 - x^7}{x^2 + 2}$

- $f(x) = \cos x \cdot \sin x$

**Exercise 4 (2 degrees):**

Determine if  $f$  is an increasing function or a decreasing function.

a)  $f(x) = x + 2$

b)  $f(x) = x^2 + 2$

c)  $f(x) = |x + 2|$

**Exercise 5 (4 degrees):**

Find the following limits:

a) $\lim_{x \rightarrow +\infty} \frac{\sqrt{x^2 + 2}}{3x - 6}$	b) $\lim_{x \rightarrow -\infty} \frac{x^4 - x}{x^3 - 5x^2 + 2}$
c) $\lim_{x \rightarrow +\infty} \frac{x}{ x }$	d) $\lim_{x \rightarrow 0^+} \frac{x + 2}{e^x - 1}$