# Al-Imam Muhammad Ibn Saud Islamic University Faculty of Sciences

Math 114

EXAM DURATION 1H

Midterm 1

28/10/2015

### Question 1. [3 marks]

Give the derivative of the following function

$$f(x) = \int_{2}^{\sqrt{x^2+4}} e^{t^2-4} dt.$$

### Question 2. [3 marks]

Find the area of the region enclosed between the curves  $y = 1 - e^{-2x}$  and  $y = 3 + \cos x$  from x = 0 to  $x = \pi$ .

## Question 3. [2+2+2+2=8 marks]

Evaluate the following integrals

1. 
$$\int_1^e \frac{(\ln x)^3}{x} dx$$
 (Use substitution)

2. 
$$\int_0^{\frac{\pi}{2}} (x+1)\cos x \, dx$$
 (Use integration by parts)

3. 
$$\int_0^{\frac{\pi}{6}} \sin^2 x \cos^3 x \, dx.$$

$$4. \int_0^1 \frac{e^x}{2e^x + 3} \, dx.$$

#### Question 4. [2+2+2=6 marks]

1. Evaluate the following integrals

(i) 
$$\int_3^4 \frac{1}{x^2 + x - 2} dx$$
 (ii)  $\int_0^1 \frac{1}{x^2 + 2x + 2} dx$ .

2. Evaluate the following improper integral

$$\int_0^3 \frac{2}{\sqrt{3-x}} \, dx.$$