

King Saud University

Faculty of Sciences

Department of Mathematics

First Examination

Math 106

Semester I

1438-1439

Time: 1H30

**Exercise 1 :** (3+2+3)

a) Find the value of  $a$  so that  $\sum_{k=1}^{10} k^2 - ak = 0$ .

b) If  $F(x) = \cos(x^2) \int_0^{x^2} \cos^4(t) dt$ . Find  $F'(0)$ .

c) Use Simpson's rule with  $n = 4$  to approximate the integral  $\int_{-1}^1 \sqrt{1+x^4} dx$ .

**Exercise 2 :** (3+3+2)

a) Evaluate  $\int x^{\frac{1}{4}} (x^{\frac{5}{4}} - 4)^3 dx$ .

b) Compute the integral  $\int_1^e \frac{\sqrt[3]{1+\ln(x)}}{x} dx$ .

c) If  $y = x^{e^2}$ , find  $y'$ .

**Exercise 3 :** (3+3+3)

a) Evaluate the integral  $\int \frac{dx}{\csc(x) \sqrt{9 - \cos^2(x)}}$ .

b) Compute the integral  $\int \frac{dx}{\sqrt{e^{10x} - 25}}$ .

c) Find  $\int \frac{dx}{\sqrt{x}(x+16)}$ .