KING SAUD UNIVERSITY **First Semester 37/38**

Math Department **January 15 2017**

Final exam106 **Time: 180mn**

Question 1(2+2+3)

a) Find the constant c that satisfies the equation

$$\sum_{k=1}^{k=9}(3k^2 - k + c) = 900$$

b) Compute the integral $\int \frac{\sin(3\sqrt{x}+1)}{\sqrt{x}}\,dx$

c) Approximate the integral $\int_0^4 \frac{dx}{1+x^3}$ using Simpson's Rule with n=4

Question 2(3+3+3)

a) Evaluate the integral $\int \frac{e^{1+2\cosh^{-1}x}dx}{\sqrt{x^2-1}}$

b) Compute the integral $\int \frac{dx}{x\sqrt{x^4-16}}$

c) Find the limit $\lim_{x\to 0} \frac{\int_0^x (\sin t - t)dt}{x^4}$

Question 3(3+3+2)

a) Compute the following integral $\int x^2 \ln x dx$

b) Find the integral $\int (\sin x)^5 \cos^3 x dx$

c) Evaluate the integral $\int \cos 4x \,.\, \cos 2x dx$

Question 4(3+2+3)

a) Evaluate the integral $\int \frac{5x^2+5x+2}{(x+1)^2(x-1)}dx$

b) Compute the integral $\int \frac{dx}{x^{\frac{3}{2}}+x^{\frac{1}{2}}}$

c) Sketch the region bounded by the curves: $y = x^2$, $y = \sqrt{x}$, $x = 0, and\ x = 2$ and find its area.

Question5(3+3+2)

a) Find the volume of the solid generated by revolving the region bounded by the curves $y = x, y = \sqrt{x}$ about the line $y = 2$

b) Sketch the region R that lies inside the curve $r = 1 + cos\theta$

and outside the curve $r = 1 - cos\theta$, and find its area.

c) Find the surface area obtained by revolving the curve $r = 4cos\theta$ $0 \leq \theta \leq \pi/2$ about the x-axis