KING SAUD UNIVERSITY **Second Semester 39/40**

Math Department **April 14 2019**

Final exam106 **Time: 180mn**

Question 1(2+2)

a) Approximate the integral $\int_0^6 \sqrt{1+x^2}dx$ using Simpson's Rule with n=6

b) Find the number c in the mean value theorem for $f(x) = \frac{8}{x^2}$ on [2, 4]

Question 2(3+3+3)

a) Evaluate the integral $\int \frac{dx}{\sqrt{e^{6x}-25}}$

b) Compute the integral $\int \frac{dx}{x\sqrt{1-x^8}}$

c) Find $\int x \tan^{-1}(x)dx$

Question 3(3+3+3)

a) Compute the following integral $\int (tanx)^5 (secx)^3 dx$

b) Find the integral $\int \cos(7x)\cos(5x)dx$

c) Evaluate the integral $\int \frac{dx}{(x^2-1)^{3/2}}$

Question 4(3+3+3)

a) Evaluate the integral $\int \frac{2x-1}{x^2+4x+20}dx$

b) Sketch the region bounded by the curves: $y = 2 - x^2$, $y = x$,

$x = 0$, $x = 2$ and find its area.

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b) Set up an integral for the volume obtained by revolving the region bounded by the curves $y = x^2, y = 4$ about the line of equation

i) $y = 6$

ii) $x = -3.$

Question5(3+3+3)

a) Sketch the region R that lies inside the curve $r = 2sin\theta$ and outside the curve $r = 2 - 2sin\theta$, and find its area.

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

c) Find the length of the curve given by the equations $x = \frac{t^4}{4}$, $y = \frac{t^6}{6}$ $0 \leq t \leq 1.$