King Saud University

College of Sciences

Department of Mathematics

Final Examination	Math 106	Semester I	1439-1440	Time: 3H

Exercise 1 : (2+2)

1. Approximate $\int_0^4 \sqrt{x^3+8}dx$ using Simpson's rule with $n = 4$.
2. If $F(x) = (2+\sin(x))^{e^x}$, find $F'(x)$.

Exercise 2 : (3+3+3)

1. Evaluate $\int \frac{(3^x+1)^2}{3^x}dx$.
2. Find $\int \frac{dx}{\sqrt{2^{2x}-1}}$.
3. Compute $\int \frac{dx}{\sqrt{x}\sqrt{1+x}}$.

Exercise 3 : (3+3+3)

1. Compute $\int \frac{dx}{x\sqrt{4-x^6}}$.
2. Evaluate $\int \frac{dx}{(x^2-1)^{\frac{3}{2}}}$.
3. Find $\int \frac{4x^2}{(x-1)^2(x+1)}dx$.

Exercise 4 : (3+3+3)

1. Does the integral $\int_0^{+\infty} (1+2x)e^{-x}dx$ converge? Find its value if it does.
2. Sketch the region bounded by $y = (x-1)^2$, $y = 3-x$ and the $x-$axis and find its area.
3. Sketch the region bounded by $x = y^2 + 2$ and $x = 4 - y^2$ and set up an integral for the volume obtained by revolving the region about the line of equation $x = -1$.

Exercise 5 : (3+3+3)

1. Find the length of the curve given by: $x = \frac{t^3}{3}$, $y = \frac{2}{9}t^{\frac{9}{2}}$, $t \in [0,1]$.
2. Sketch the region inside the polar curve $r = 3 + 3\cos(\theta)$ and to the left of the $y-$axis and find its area.
3. Find the area of the surface obtained by revolving the curve of equation $r = 8\cos(\theta)$, $\theta \in [0, \frac{\pi}{2}]$ about the $y-$axis.