M-106 Calculus Integration
First Midterm Exam
1439 - 1440 H (Summer semester)

Time: 90 minutes
Name:

College of Science
Department of Mathematics

Question 1:

(a) Find the value of a if $\sum_{k=1}^{n}(k+2a) = \frac{n^2}{2}$ $(n \geq 1)$. $\boxed{\text{2 marks}}$

(b) Find a number z that satisfies the conclusion of the Mean Value Theorem for the function $f(x) = x^2 + 1$ on the interval $[1,3]$. $\boxed{\text{2 marks}}$

(c) By using the trapezoidal rule with $n = 4$, approximate the integral $\int_{1}^{2} \frac{1}{x^2+1}\,dx$. $\boxed{\text{3 marks}}$

Question 2:

(a) Find the derivative of the function $y = x^2 + 2^x + x^x$. $\boxed{\text{2 marks}}$

(b) If $F(x) = e^x \int_{0}^{\sin x} \sqrt{1+t^2}\,dt$, find $F'(0)$. $\boxed{\text{2 marks}}$

Question 3:

Evaluate the following integrals:

(a) $\int x\sqrt{x-1}\,dx$ $\boxed{\text{2 marks}}$

(b) $\int \frac{e^{\tan x}}{\cos^2 x}\,dx$ $\boxed{\text{2 marks}}$

(c) $\int (\sqrt{x} + \frac{1}{\sqrt{x}})^2\,dx$ $\boxed{\text{2 marks}}$

(d) $\int \frac{1}{4+9x^2}\,dx$ $\boxed{\text{2 marks}}$

(e) $\int \frac{1}{\sqrt{e^{2x}-4}}\,dx$ $\boxed{\text{3 marks}}$

(f) $\int e^x \operatorname{csch} x\,dx$ $\boxed{\text{3 marks}}$