Prince Sultan University

Department of Mathematical Sciences

MATH 113 – First Examination

28 March 2009

Time allowed: 45 minutes — Dr. Bahaa Eldin Abdalla

Maximum points: 36 points

1. (10 points) Evaluate each integral.

   (a) $\int (x+1)(x-1)\,dx$

   (b) $\int 4\dfrac{\cot x}{\sin^2 x}\,dx$

   (c) $\int \dfrac{2x+3}{x+7}\,dx$

2. (5 points) Evaluate $\int_0^3 f(x)dx$, where $f(x)$ is defined by $f(x)=\begin{cases}2x & \text{if } x\le 2\\ 1 & \text{if } x>2\end{cases}$. (Do not use the calculator)

3. (6 points) Compute the sum $\sum_{i=1}^{n}\frac{1}{n}\left(\left(\frac{i}{n}\right)^2+2\left(\frac{i}{n}\right)\right)$. Compute the limit of the sum as $n\to\infty$.

4. (5 points) Find the value(s) of x^* that satisfies the Mean-Value Theorem for the function $f(x)=\frac{1}{x^2}$ over the interval $[-3,-1]$.

5. (6 points) Find the total area between the curve $y = x^2 - x$ and the x-axis over the interval $[-1,3]$. Sketch the graph of the region.

6. (4 points) If an object's downward acceleration is given by $a(t) = -32$ ft/s^2, find the position function. Assume that the initial velocity is $v(0) = -100$ ft/s and the initial position is $s(0) = 100{,}000$ feet.