Uva Wellassa University, Sri Lanka
Btech. Science and Technology
End Semester Examination- Semester 1
January -2009

AAS 213-2 – Mathematics for Biological Sciences

Time: Two hours
Answer All (04) questions
Calculators are acceptable
All expressions are given in standard mathematical notations

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1. a. If $y = e^{ax+b}$, then show that $\ln y = ax + b$.

   b. Show that $2\ln(x+1) - 2\ln(x-1) + \ln C = \ln\left\{C\left(\frac{x+1}{x-1}\right)^2\right\}$ where $x > 1$ & $C > 0$.

   c. Find the value of x, If $3^x - \frac{1}{3^x} = 1$. (Hint : substitute $3^x = u$.)

2. a. Find $\frac{d(x^3)}{dx}$

   b. Evaluate $\int_0^1 \frac{1}{x^2}$

   c. Find the area in the $x\,y$ plane bounded by the x -axis and $y = x^2$.

3. a. If the matrices $A = \begin{pmatrix} 1 & 2 \\ 1 & 0 \end{pmatrix}$ and $B = \begin{pmatrix} 1 & 1 \\ 0 & 1 \end{pmatrix}$, then find

   i. $A + B$
   ii. $2A$
   iii. AB

4. a. If a ball is dropped from the top of a 100-metre tower on the surface of the Moon, its height S (in meters) at the end of t seconds will satisfy the equation $S = 100 - 0.83t^2$ until the ball hits the ground.

i. What is the velocity at the end of 2 seconds?

ii. How many seconds after the ball will reach the ground?

b. A company manufactures 2 products X and Y. The total cost in dollars for producing x units of product X and y units of product Y is given by the function

$$C(x, y) = \frac{1}{3}x^2 + \frac{1}{2}y^2 + x + y + 700$$

i. Find the cost of producing 20 units of X and 50 units of Y.

ii. If the company doesn't produce X and Y, is there any cost for the company? If so find the cost.