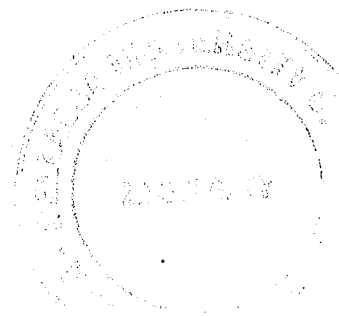




Uva Wellassa University, Sri Lanka  
 Btech. Science and Technology  
 End Semester Examination- Semester 1  
 January -2009



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

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.