

MATHEMATICS-1**Exam NAME:****19 January 2011**

1. (6p)	2. (6p)	3. (10p)	4. (13p)	5. (6p)	6. (6p)	7. (9p)	Th. (4p)	Σ (Max 60p)	MW	Σ +MW

Corrected by:

- Let be given the points $P_1=(1, 1, 2)$, $P_2=(2, 3, 6)$ and the vector $\underline{n} = -2\underline{i} + 3\underline{j} + 5\underline{k}$.
 - Find the equation of the plane passing through P_1 and perpendicular to \underline{n} !
 - Find the equation of the line passing through the points P_1 and P_2 !
 - Find the angle between the vectors \underline{n} and $\overrightarrow{P_1P_2}$!
- Find the derivative of the following functions
 - by definition: $f(x) = (3x+1)^2$
 - by rules: $g(x) = (3x+1)^2 (2\sqrt{x^3} + \cos 5x)$
- Sketch the graph of the function $f(x) = 2x - \frac{27}{x^2}$
- Find the following integrals:
 - $\int (5x^4 + 3) \cdot \sin(x^5 + 3x) dx$;
 - $\int (3x^2 + 2) \cdot \ln x dx$;
 - $\int_1^{\infty} \frac{6}{x \cdot (x+2)} dx$
- Find the volume of the solid given by the rotation of $f(x) = \sqrt{x+1} \cdot e^{-x}$ over $[-1;0]$ about the x -axis!
- Solve the following linear system:

$$\begin{array}{rrcr} x & + & 2y & + & z & = & 0 \\ 2x & + & 5y & - & z & = & -5 \\ x & + & 6y & + & 3z & = & -6 \end{array}$$
- Let be given the following matrices:

$$A = \begin{bmatrix} 2 & 6 \\ 1 & 4 \end{bmatrix} ; \quad B = \begin{bmatrix} 0 & 2 & 1 \\ 3 & 1 & 0 \end{bmatrix}$$

Find the matrices if they exist: $A+B$; AB ; BA ; A^{-1} ; B^{-1}

Theoretical question:

Let be given the matrix $A = \begin{bmatrix} a & b \\ c & d \end{bmatrix}$ where $\det(A) = a \cdot d - c \cdot b \neq 0$

$$\text{Show that } A^{-1} = \frac{1}{\det(A)} \cdot \begin{bmatrix} d & -b \\ -c & a \end{bmatrix}$$