

<p>Engineering Mathematics and Physics Department</p> <p>Analytical Geometry and Algebra Course Code: Math 102 Time Allowed: 2 hours</p>	 <p>Modern University For Technology & Information Faculty of Engineering</p>	<p>Academic year: 2008/2009 Semester: Summer July, 26, 2009 Examiners: Dr. Mona Mehanna Dr. Mohamed Eid</p>
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Answer Four questions only

[1](a) Using the binomial theorem, expand $\frac{1}{2-3x}$.

(b) Using the Math. Induction, prove that: $1.4 + 2.7 + 3.10 + \dots + n(3n+1) = n(n+1)^2$

(c) Solve the equation $2x^4 - 9x^3 + 14x^2 - 9x + 2 = 0$ where the number 1 is repeated root.

[2](a) Find the sum $\sum_{r=1}^{20} r(1+2r^2)$.

(b) If $A = \begin{bmatrix} 2 & 1 & 2 \\ 0 & 2 & 1 \\ 4 & 0 & 2 \end{bmatrix}$ and $B = \begin{bmatrix} 2 & 3 & 1 \\ 0 & 2 & 1 \end{bmatrix}$. Find, if possible, $A+B$, $|B|$, BA , A^{-1} .

(c) Solve the linear system: $x_1 + x_2 - 2x_3 + x_4 = 1$, $2x_1 + x_2 - 2x_3 + x_4 = 2$,
 $-x_1 + 2x_2 - x_3 + 3x_4 = 3$, $x_1 + x_2 + x_3 + x_4 = 4$

[3](a) Find the eigenvalues and the eigenvectors of the matrix $A = \begin{bmatrix} 1 & 0 & 1 \\ 0 & 2 & 0 \\ 0 & 1 & 3 \end{bmatrix}$.

(b) Identify the surfaces: (i) $y^2 + 2z^2 = 2x$ (ii) $16x^2 - 9y^2 - 36z^2 = 144$

[4](a) Remove terms of the first degree from the equation: $4x^2 + y^2 - 16x + 6y + 9 = 0$

(b) The extremities of the diameter of a circle are (2, 1) and (4, 3). Find its equation and find the equations of the tangents which are parallel to this diameter.

[5] Describe the following curves:

(a) $9x^2 + 16y^2 = 576$ (b) $5y^2 = -20x$ (c) $9x^2 - 16y^2 - 18x - 64y - 199 = 0$

Good luck

Dr. Mona Mehanna

Dr. Mohamed Eid

<p>Engineering Mathematics and Physics Department</p> <p>Math 2 (Algebra) Mid-Term Exam Time Allowed: 90 Minuets</p>	 <p>Modern University For Technology & Information Faculty of Engineering</p>	<p>Academic year: 2008/2009 Semester: Summer 6 – 7 - 2009 Examiner: Dr. Mohamed Husein Eid</p>
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Answer the following questions:

- (1) Using the mathematical induction, prove that: $2 + 6 + 18 + \dots + 2 \times 3^{n-1} = 3^n - 1$
- (2) Using the binomial theorem, expand $\frac{1}{\sqrt[3]{8+4x}}$.
- (3) Find the sum $\sum_{r=1}^n \frac{1}{(3r-2)(3r+1)}$.
- (4) Solve the equation $x^4 - 4x^3 - x^2 + 16x - 12 = 0$ if the numbers 2, -2 are roots.
- (5) If $A = \begin{bmatrix} 2 & 3 & 1 \\ 0 & -1 & 2 \end{bmatrix}$, $B = \begin{bmatrix} 1 & 2 & 1 \\ 3 & 0 & 2 \\ -1 & 2 & 3 \end{bmatrix}$, $C = \begin{bmatrix} 1 & 0 & -2 \\ 0 & 3 & 2 \\ -2 & 1 & 4 \end{bmatrix}$
Find, if possible, $A + B$, $A + C$, $B + C$.

Good Luck

Dr. Mohamed Husein Eid