Answer **Five** questions only

Question 1

(a) Find the vertex, focus, and sketch the parabola $x^2 - 4x - 12y + 28 = 0$.

(b) Find the center, vertices and foci of the curve (and sketch) $16x^2 + 9y^2 - 72y = 0$.

Question 2

(a) Separate the lines and find the angle between them $x^2 + xy - 2y^2 + 6y - 4 = 0$.

(b) Write the equation of the plane which passes through the points (0, –1, 3), (2, 1, 2) and (1, – 2, 4).

Question 3

(a) Complete the statement: The hyperbola is the locus of moving point such that….

(b) Determine the centre and radius of the circle $x^2 + y^2 - 2x + 4y + 1 = 0$. Also, write it in parametric form.

(c) Describe each of the following surfaces: (i) $z^2 - x^2 + y^2 = 0$

(ii) $x^2 + y^2 + z^2 - 2x + 4y - 8z = 0$ (iii) $x^2 + y^2 + 3z = 0$

Question 4

(a) If $\alpha_1, \alpha_2, \alpha_3$ are the roots of the equation: $3x^3 - x + 1 = 0$, find $\sum_{i=1}^{3} (\alpha_i)^2$, $\sum_{i=1}^{3} (\alpha_i)^3$

(b) Using mathematical induction to prove the validity of the following:

$$\frac{1}{1\times2} + \frac{1}{2\times3} + \frac{1}{3\times4} + \cdots + \frac{1}{n\times(n+1)} = \frac{n}{n+1}$$

Question 5

(a) Using the binomial theorem, expand $(8-3x)^{\frac{5}{3}}$.

(b) Use De Moiver's theorem to evaluate $(2\sqrt{3}-2i)^{\frac{4}{3}}$.

(c) Find the sum $\sum_{r=1}^{n} \frac{1}{r(r+1)}$.

Question 6

(a) Find the eigenvalues and the eigenvectors of the matrix $A = \begin{bmatrix} -4 & -5 \\ 2 & 3 \end{bmatrix}$

(b) Solve the linear system $x + 2y + 2z = 5$, $2x + y - 2z = 0$, $2x - y + z = 2$.

Good luck   *Dr. Mona Mehanna*   *Dr. Mohamed Eid*

Mathematics 2: A. Geometry

Time: 30 Minuets   Mid-Term Exam   Summer Semester

Answer the following questions:

[1]Complete the statement: Parabola is the locus of moving point such that….

[2]Separate the lines $2x^2 + 5xy + 2y^2 + x - y - 1 = 0$ and find the angle between them.

[3]Write the equation of circle where the points $(1, -1)$, $(3, 3)$ are ends of diameter.
   And determine its radius.

[4]Write the equation of the parabola of focus F(2, 2), and directrix is $y - 4 = 0$

[5]Write the circle $x^2 + y^2 + 4x - 6y + 9 = 0$ in parametric form and write its tangent at $(-2, 1)$.

Quiz: Answer the following questions:

[1] Find the center, vertices, major and minor axes of the ellipse and sketch its curve

$$9x^2 + 16y^2 - 72x + 96y + 144 = 0$$

[2] Find the center, vertices, foci and sketch the curve $y^2 - x^2 + 4x - 4y - 9 = 0$

[3] Write the equation of the plane which passes through the points $P(1, -2, 2)$, $Q(0, 1, 3)$ and $S(2, 3, 1)$.