Indian Institute of Technology Bombay
MA 001 Preparatory Mathematics I

Quiz 2

Date: October 18, 2004 — Maximum Marks: 16
Duration: 30 Minutes — Weightage : 8 %

Note: Write the answers in the space provided on the question paper. The supplement sheet provided to you is for rough work. It should be submitted alongwith this question-cum-answer paper. Please ensure that you write your name and roll number below as well as on the supplement sheet.

Name: **Roll No.:**

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1. Find an equation of the line whose x-intercept and y-intercept are given, respectively, by the sum and the product of the roots of the equation $2x^5 - 6x^4 + 5x^3 - 7x^2 + 11x + 12 = 0$.

Answer:

[4 points]

2. Find the foci and the eccentricity of the following conics.
(i) $4x^2 + 25y^2 - 100 = 0$, (ii) $xy = 2$.

(i)
Answer:
(ii)

[4 points]

3. Let F be the focus of the parabola $y^2 = 8x$. Determine the equation of the conic $4x^2 - 9y^2 - 16x = 20$ in the new coordinate system obtained by translating the origin to F. Also, find the asymptotes, if any, of the conic in the new coordinate system.

Answer:

[4 points]

4. State whether the following statements are True or False by circling T or F.

   (i) The number of unordered arrangements, with repetition allowed, of any 3 elements from the set of first four prime numbers is 30. (T / F)

   (ii) If $f(x, y)$ and $g(x, y)$ are quadratic polynomials in two variables with real coefficients, which define the same conic, then there is $\lambda \in \mathbb{R}$ with $\lambda \neq 0$ such that $f(x, y) = \lambda g(x, y)$. (T / F)

   (iii) If $f(x, y) = (2x + 3y)(3x - 2y)$, then the discriminant of the conic $f(x, y) = 0$ is zero. (T / F)

   (iv) If $f(x, y) = ax^2 + 2hxy + by^2$ and the δ-invariant of $f(x, y)$ is positive, then the origin is the only point of $\mathbb{R}^2$ which lies on the conic $f(x, y) = 0$. (T / F)

[4 points]