MAT110
Mathematics I

Transformation of Co-ordinates

1. Find the polar co-ordinates of the points $(2\sqrt{3},-2),\ (0,-2),\ (1,1)$.
2. Find the rectangular co-ordinates of the points $(7, 2\pi/3),\ (8, 9\pi/4),\ (0,\pi)$.
3. Change to Cartesian coordinates the equations $(i)\, r = a\sin\theta,\ (ii)\sqrt{r} = \sqrt{a}\cos\left(\frac{\theta}{2}\right)$.
4. Transform to polar coordinates the equations $(i) 9x^2 + 4y^2 = 36,\ (ii) x^3 = y^2(2a - x)$.
5. Transform to parallel axes through the new origin (1,-2) of the equation $2x^2 + y^2 - 4x + 4y = 0$.
6. Transform the equation $x^2 + y^2 - 8x + 14y + 5 = 0$ to parallel axes through (4,-7).
7. Transform the equation $7x^2 - 2xy + y^2 + 1 = 0$ to axes turned through the angle $\tan^{-1}\left(\frac{1}{2}\right)$.
8. Transform the equation $11x^2 + 24xy + 4y^2 - 20x - 40y - 5 = 0$ to rectangular axes through the point (2,-1) and inclined at an angle $\tan^{-1}\left(\frac{4}{3}\right)$.
9. Transform the equation $9x^2 + 15xy + y^2 + 12x - 11y - 5 = 0$, so as to remove the terms in x and y.
10. Transform the equation $11x^2 + 3xy + 7y^2 + 19 = 0$, so as to remove the term xy.
11. Determine the equation of the curve $2x^2 + 4xy + 5y^2 - 4x - 22y + 7 = 0$ when the origin is transferred to the point $(-2,3)$.
12. Remove the xy term from the equation $9x^2 + 24xy + 2y^2 + 54 = 0$.
13. Determine the equation $x^2 + 2\sqrt{3}xy - y^2 = 2a^2$ after rotating of axes through 30°.
14. Transform the equation $9x^2 + 24xy + 2y^2 - 6x + 20y + 41 = 0$ so as to remove the terms in x and y.