6. Cont.

$$\cos\theta = \frac{\sqrt{10}}{10} \qquad \sin\theta = \frac{3\sqrt{10}}{10}$$

$$x = x'\cos\theta - y'\sin\theta \qquad y = x'\sin\theta + y'\cos\theta$$

$$x = \frac{\sqrt{10}}{10}x' - \frac{3\sqrt{10}}{10}y' \qquad y = \frac{3\sqrt{10}}{10}x' + \frac{\sqrt{10}}{10}y'$$

$$x = \frac{\sqrt{10}}{10}(x' - 3y') \qquad y = \frac{\sqrt{10}}{10}(3x' + y')$$

LET $x' = P$ AND $y' = Q$

$$x = \frac{\sqrt{10}}{10}(P - 3Q) \qquad y = \frac{\sqrt{10}}{10}(3P + Q)$$

(3) $9x^2 - 6xy + y^2 - 10\sqrt{10}x - 30\sqrt{10}y = 0$

$$9\left[\frac{\sqrt{10}}{10}(P-3Q)\right]^2 - 6\left(\frac{\sqrt{10}}{10}(P-3Q)\cdot\frac{\sqrt{10}}{10}(3P+Q)\right) + \left[\frac{\sqrt{10}}{10}(3P+Q)\right]^2$$
$$- 10\sqrt{10}\left[\frac{\sqrt{10}}{10}(P-3Q)\right] - 30\sqrt{10}\left[\frac{\sqrt{10}}{10}(3P+Q)\right] = 0$$

$$9\left[\frac{10}{100}(P-3Q)^2\right] - 6\left[\frac{10}{100}(P-3Q)(3P+Q)\right] + \frac{10}{100}(3P+Q)^2$$
$$-10(P-3Q) - 30(3P+Q) = 0$$

$$\frac{9}{10}(P-3Q)^2 - \frac{6}{10}(P-3Q)(3P+Q) + \frac{1}{10}(3P+Q)^2 - 10(P-3Q) - 30(3P+Q) = 0$$

$$9(P-3Q)^2 - 6(P-3Q)(3P+Q) + (3P+Q)^2 - 100(P-3Q) - 300(3P+Q) = 0$$

$$9(P-3Q)(P-3Q) - 6(3P^2 + PQ - 9PQ - 3Q^2) + (3P+Q)(3P+Q) - 100P + 300Q - 900P - 300Q = 0$$

$$9(P^2 - 3PQ - 3PQ + 9Q^2) - 6(3P^2 - 8PQ - 3Q^2) + 9P^2 + 3PQ + 3PQ + Q^2 - 1000P = 0$$

$$9(P^2 - 6PQ + 9Q^2) - 18P^2 + 48PQ + 18Q^2 + 9P^2 + 6PQ + Q^2 - 1000P = 0$$

$$9P^2 - 54PQ + 81Q^2 - 9P^2 + 54PQ + 19Q^2 - 1000P = 0$$

$$100Q^2 - 1000P = 0$$

$$100Q^2 = 1000P$$