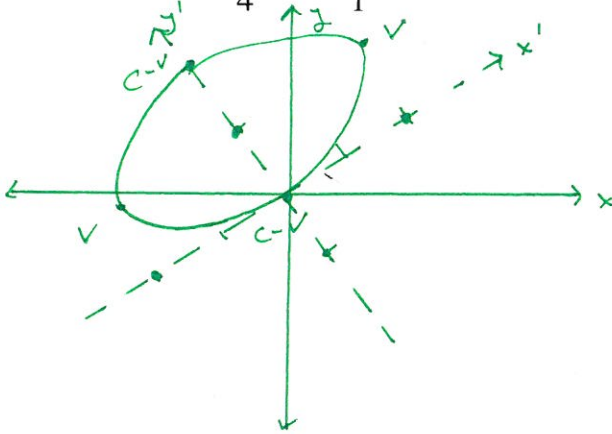
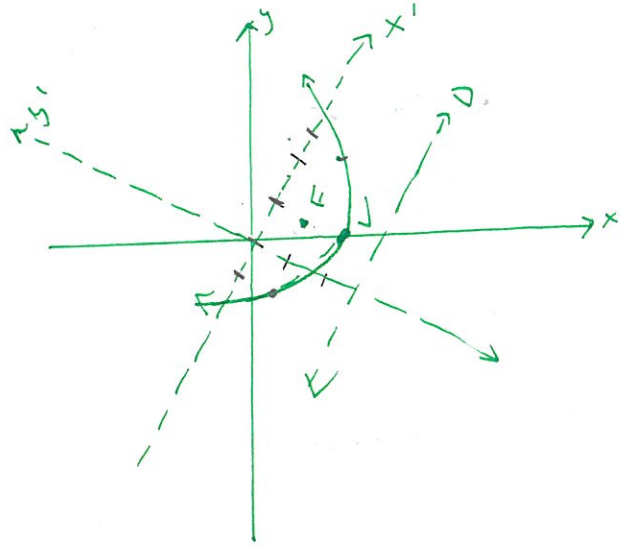


Graph.

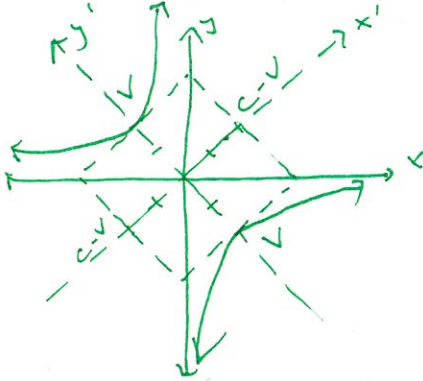
$$1. \theta = 30^\circ, \frac{(x')^2}{4} + \frac{(y'-1)^2}{1} = 1$$



$$2. \theta = 60^\circ, (x'-1)^2 = 4(y'+2)$$



$$3. \theta = 45^\circ, \frac{(y')^2}{4} - \frac{(x')^2}{4} = 1$$



Find cos and sin of the rotation angle.

$$4. \tan 2\theta = \frac{5}{12}$$

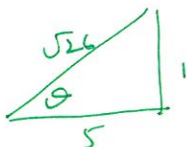
$$\frac{5}{12} = \frac{2 \tan \theta}{1 - \tan^2 \theta}$$

$$24 \tan \theta = 5 - 5 \tan^2 \theta$$

$$5 \tan^2 \theta + 24 \tan \theta - 5 = 0$$

$$(5 \tan - 1)(\tan + 5) = 0$$

$$\tan \theta = \frac{1}{5} \quad \tan \theta = -5$$



$$\cos \theta = \frac{5\sqrt{26}}{26}$$

$$\sin \theta = \frac{\sqrt{26}}{26}$$

Write the equation in standard form with x' and y' , then graph.

5. $13x^2 + 6\sqrt{3}xy + 7y^2 - 16 = 0$

Classify ELLIPSE

angle of rotation 30°

$$\tan 2\theta = \frac{6\sqrt{3}}{6} = \sqrt{3}$$

$$x = \frac{\sqrt{3}x' - y'}{2}$$

$$y = \frac{x' + \sqrt{3}y'}{2}$$

6. $3x^2 - 2\sqrt{3}xy + y^2 + 2x + 2\sqrt{3}y = 0$ ~~$x^2 + 4xy + 2x^2 + 1 = 0$~~

Classify PARABOLA

angle of rotation 60°

$$\tan 2\theta = \frac{-2\sqrt{3}}{2} = -\sqrt{3} \quad \Pi$$

$$x = \frac{x' - \sqrt{3}y'}{2}$$

$$y = \frac{\sqrt{3}x' + y'}{2}$$

$$2\theta = 120^\circ$$

$$\theta = 60^\circ$$

7. $x^2 + 4xy - 2y^2 - 1 = 0$

Classify HYPERBOLA

angle of rotation 26.6°

$$\tan 2\theta = \frac{4}{3}$$

$$\frac{4}{3} = \frac{2\tan\theta}{1-\tan^2\theta}$$

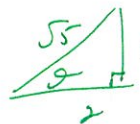
$$6\tan\theta = 4 - 4\tan^2\theta$$

$$4\tan^2\theta + 6\tan\theta - 4 = 0$$

$$2\tan^2\theta + 3\tan\theta - 2 = 0$$

$$(2\tan\theta - 1)(\tan\theta + 2) = 0$$

$$\tan\theta = \frac{1}{2}$$



$$\cos\theta = \frac{2}{5} = \frac{2\sqrt{5}}{5}$$

$$\sin\theta = \frac{1}{5} = \frac{\sqrt{5}}{5}$$