Honors PreCalculus
Test Conics 2D A

Name: key

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No calculator may be used on this exam.

Write the following equations in standard form and give the following information. If it does not apply write N/A. If degenerate, state solution.

1. $x^2 - 4y^2 - 2x - 16y - 11 = 0$

$x^2 - 2x + 1 - 4(y^2 + 4y + 4) = 11 - 16 + 1$

$(x-1)^2 - 4(y+2)^2 = -4$

$\frac{(x-1)^2}{-4} + \frac{(y+2)^2}{1} = 1$

$\frac{(y+2)^2}{1} - \frac{(x-1)^2}{4} = 1$

$c^2 = 1 + 4$

$c^2 = 5$

$c = \sqrt{5}$

$y = \frac{1}{2}x - \frac{1}{2} - 2$

$y = \frac{1}{2}x - 2\frac{1}{2}$

Standard Form: $\frac{(y+2)^2}{1} - \frac{(x-1)^2}{4} = 1$ +1

Center: $(1, -2)$ +1

Vertices: $(1, -1)$ $(1, -3)$ +1

Foci: $(1, -2 \pm \sqrt{5})$ +1

Eccentricity: $\frac{\sqrt{5}}{1}$ +1

Radius: N/A

Asymptote Equations: $y + 2 = \pm\frac{1}{2}(x - 1)$ +1

2. $4x^2 + 9y^2 - 16x + 18y - 11 = 0$

$4x^2 - 16x + 9y^2 + 18y - 11 = 0$

$4(x^2 - 4x + 4) + 9(y^2 + 2y + 1) = 11 + 16 + 9$

$4(x-2)^2 + 9(y+1)^2 = 36$

$\frac{(x-2)^2}{9} + \frac{(y+1)^2}{4} = 36$

$a^2 = b^2 + c^2$

$9 = 4 + c^2$

$5 = c^2$

$\sqrt{5} = c$

Standard Form: $\frac{(x-2)^2}{9} + \frac{(y+1)^2}{4} = 1$ +1

Center: $(2, -1)$ +1

Vertices: $(5, -1)$ $(-1, -1)$ $(2, 1)$ $(2, -$ +1

Foci: $(2 \pm \sqrt{5}, -1)$ +1

Eccentricity: $\frac{\sqrt{5}}{3}$ +1

Radius: N/A

Asymptote Equations: N/A

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3. $3x^2+3y^2+6x+12y+15=0$

$3x^2+6x+3y^2+12y+15=0$

$3(x^2+2x+1)+3(y^2+4y+4)=-15+3+12$

$3(x+1)^2+3(y+2)^2=0$

+2pt: $(-1,-2)$

Standard Form: $3(x+1)^2+3(y+2)^2=0$

Vertices: N/A

Foci: N/A

Eccentricity: N/A

Radius: N/A

Asymptote Equations: NA

4. $2x^2-16x+16y+64=0$

$2(x^2-8x+16)+16y+64=0+32$

$2(x-4)^2=-16y-64+32$

$2(x-4)^2=-16y-32$

$2(x-4)^2=-16(y+2)$

$\frac{-1}{8}(x-4)^2=y+2$

$\frac{-1}{8}=\frac{1}{4c}$

$c=2$

Standard Form: $\frac{-1}{8}(x-4)^2=y+2$ +1

Vertices: $(4,-2)$ +1

Foci: $(4,-4)$ +1

Directrix: $y=0$ +1

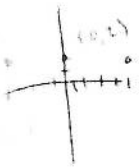
Eccentricity: 1 +1

Radius: N/A

Asymptote Equations: N/A

Find the standard form equations for:

5. Ellipse having Foci (5,2) and (-5,2) and major axis = 12



$a^2 = b^2 + c^2$

$36 = b^2 + 5^2$

$36 - b^2 + 25$

$11 = b^2$

$\frac{x^2}{36} + \frac{(y-2)^2}{11} = 1$

6. Hyperbola with eccentricity $\frac{5}{4}$, Foci at (0,9), and (0,-1)

$\frac{c}{a} = \frac{5}{4}$

$\frac{9+(-1)}{2} = \frac{8}{2} = 4$

Center $(0,4)$

$c = 5$

$a = 4$

$25 = 16 + b^2$

$-16 \quad -16$

$9 = b^2$

$\frac{(y-4)^2}{16} - \frac{x^2}{9} = 1$

7. Circle with endpoints of a diameter (-2,1) and (6,9)

$\left(\frac{-2+6}{2}, \frac{1+9}{2}\right) = \left(\frac{4}{2}, \frac{10}{2}\right) = (2,5)$

$d = \sqrt{(2-(-2))^2 + (5-1)^2}$

$d = \sqrt{16+16}$

$d = \sqrt{32}$

$(x-2)^2 + (y-5)^2 = 32$

8. $9x^2 - 2\sqrt{3}xy + 11y^2 - 24 = 0$ After rotation of axes, transforms to $\frac{x'^2}{3} + \frac{y'^2}{2} = 1$

Find the foci in the xy-coordinate system.

$a^2 = b^2 + c^2$

$3 = 2 + c^2$

$1 = c^2$

$1 = c$

$\tan 2\theta = \frac{-2\sqrt{3}}{9-11} = \sqrt{3}$

$2\theta = \pi/3$

$\theta = \pi/6$

$F'(1,0) \quad (-1,0)$

$F\left(\frac{\sqrt{3}}{2}, \frac{1}{2}\right) \quad \left(-\frac{\sqrt{3}}{2}, -\frac{1}{2}\right)$

$x = x'\cos\pi/6 - y'\sin\pi/6$

$y = x'\sin\pi/6 + y'\cos\pi/6$

$x = \frac{\sqrt{3}}{2}x' - \frac{1}{2}y'$

$y = \frac{1}{2}x' + \frac{\sqrt{3}}{2}y'$

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