

Take Home Assignment 3 GE1358/MA1501

For each of the following questions, write down your solution with details of steps. Marks will not be given if only final answers are provided.

1. Rewrite the polar equation $r = \sin(2\theta)$ in Cartesian form.
2. Given the Cartesian Coordinates, provide the polar coordinates for the points
 - (a) $(2, 2)$
 - (b) $(1, -\sqrt{3})$
 - (c) $(-1, \sqrt{3})$
3. Find the equation of the tangent to the curve $r = \theta$ when $\theta = \frac{\pi}{2}$. (*Hint, you may need to use derivatives.*)
4. Please answer the following two questions:
 - (a) The two points A(5,7) and B(-5,-7) are on the Cartesian plane. A circle has AB as diameter. Find the equation of the circle.
 - (b) The point (-6,2) is an extremity of a diameter of the circle $x^2 + y^2 = 40$. Find the coordinates of the other extremity of the same diameter.
Hint: extremity means a point at one end.
5. For each given equation, please identify the vertex, focus, axis of symmetry, and directrix. Finally sketch the graph (you must label all the components mentioned in the above to get full marks)
 - (a) $(x + 8)^2 = 8(y - 3)$
 - (b) $3x^2 + 72 = -72y$
6. For each given equation, please identify the center, vertex or vertices, focus or foci, and asymptotes. Finally sketch the graph (you must label all the components mentioned in the above to get full marks)
 - (a) $\frac{(x+6)^2}{64} - \frac{(y+5)^2}{58} = 1$.

(b) $-4x^2 + 3y^2 + 72x - 18y = 321$.

For (b) also determine the eccentricity, if possible.

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