Math 4050 **Practice Problem Set #7**

Revised

At the top of your write-up, you must also write a statement attesting that you have at least thought about all assigned problems. Points will be deducted if you do not write this statement. This does not mean that you solved all of the problems — just that you gave some thought about how to solve every problem. For the sake of preparing for the state certification exam, as well as for your own integrity, I'd prefer that you are honest when writing this statement.

Problem 7.1 Plot the following points in polar coordinates:

- $(5, \pi/3)$
- $(-6, 5\pi/6)$
- $(7, -\pi/2)$
- $(-4, -13\pi/6)$

Problem 7.2 Convert $(-4, 5\pi/4)$ from polar coordinates to rectangular coordinates, accurate to three decimal places.

Problem 7.3 Let P be the point $(4\sqrt{3}, -4)$ in rectangular coordinates. Find three different representations of P using polar coordinates.

Problem 7.4 Change the equation $r = -3\cos\theta$ into rectangular form.

Problem 7.5 Sketch the graph of $r = 4 + 4\cos\theta$ using polar coordinates.

Problem 7.6 Sketch the graph of $r = 8\sin 2\theta$ using polar coordinates.

Problem 7.7 Sketch the graph of $r = 2 - 5\cos\theta$ using polar coordinates.

Problem 7.8 Sketch the graph of the conic section

$$3y^2 + 12x - 18y + 3 = 0$$

- If it's a parabola, find the vertex, focus, directrix, and focal chord.
- If it's an ellipse, find the center, endpoints of the major axis, endpoints of the minor axis, foci, and the sum of the lengths from the foci to any point on the ellipse.
- If it's a hyperbola, find the center, vertices, asymptotes, and the difference of the lengths from the foci to any point on the hyperbola.
- If it's degenerate, explain why.

Problem 7.9 Sketch the graph of the conic section

$$x^2 - 4y^2 - 12x - 16y + 16 = 0$$

- If it's a parabola, find the vertex, focus, directrix, and focal chord.

- If it's an ellipse, find the center, endpoints of the major axis, endpoints of the minor axis, foci, and the sum of the lengths from the foci to any point on the ellipse.
- If it's a hyperbola, find the center, vertices, asymptotes, and the difference of the lengths from the foci to any point on the hyperbola.
- If it's degenerate, explain why.

Problem 7.10 Sketch the graph of the conic section

$$5x^2 + 2y^2 + 20y - 30x + 75 = 0$$

- If it's a parabola, find the vertex, focus, directrix, and focal chord.
- If it's an ellipse, find the center, endpoints of the major axis, endpoints of the minor axis, foci, and the sum of the lengths from the foci to any point on the ellipse.
- If it's a hyperbola, find the center, vertices, asymptotes, and the difference of the lengths from the foci to any point on the hyperbola.
- If it's degenerate, explain why.

Problem 7.11 Find the hyperbola which passes through $(0, -3)$ which has asymptotes

$$y = -\frac{3}{2}x \qquad \text{and} \qquad y = \frac{3}{2}x - 6.$$

Problem 7.12 Find the parabola with focus $(1, 3)$ and directrix $x = -5$.

Problem 7.13 Find the ellipse with vertices at $(4, -7)$ and $(4, 3)$ and foci at $(4, -6)$ and $(4, 2)$.

Problem 7.14 The following function describes the graph of a conic section:

$$r = \frac{9}{3 - 2\sin\theta}$$

Convert this equation into rectangular form and determine if it represents a parabola, ellipse, or hyperbola.

Problem 7.15 The following function describes the graph of a conic section:

$$r = \frac{5}{4 + 4\cos\theta}$$

Convert this equation into rectangular form and determine if it represents a parabola, ellipse, or hyperbola.