Name: ________________________________

Please show all work and justify your statements. Label sketches, draw conclusions (using complete sentences and including units), and box your final answers as appropriate.

1. Find a plane that intersects the graph of \( z = (x^2 + 1) \sin y + xy^2 \) in a parabola. Repeat the question for a straight line.
   
   Hint: in each case set one variable constant.

2. Determine whether \( \frac{xy}{x^2 + y^2} \) has a limit as \((x, y) \to (0, 0)\).
   
   If yes, what is the limit? If no, explain why the limit fails to exist.

3. H.M.S. Jabanic encounters a 5 km/h current towards 30° south of east. If the engines can produce a maximum speed of 15 km/h in still water, what is the fastest progress Jabanic can make due west?

4. What is the angle between the planes \( 2x - 3y + 4z = 2 \) and \( x + y - 3z = 5 \)? What is the direction of the intersection of these planes?

5. Find the local linearization of \( x \sin(y \ln x) \) at the point (2, 1).

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