1. (1 pt each) Sketch the graph of each function. Label your graph.
   (a) \( f(x, y) = 5 - x^2 - y^2 \)
   (b) \( f(x, y) = -\sqrt{16 - x^2 - 16y^2} \)

2. (1 pt) Find and sketch the domain of each function.
   (a) \( f(x, y) = 4\sqrt{y - x \ln(x + y)} \)
   (b) \( f(x, y) = \frac{4x + 3y}{5x - 2y} + \ln(2x^2 + 2y^2 - 8) \)

3. (2 pts) A particle starts at the origin with initial velocity \( \mathbf{i} - \mathbf{j} + 3\mathbf{k} \). Its acceleration is \( \mathbf{a}(t) = 6t\mathbf{i} + 12t^2\mathbf{j} - 6t\mathbf{k} \). Find its position function.

4. (1 pt each) A particle has a position function \( \mathbf{r}(t) = t\mathbf{i} + \cos^2 t\mathbf{j} + \sin^2 t\mathbf{k} \).
   (a) Find the tangential component of the acceleration vector.
   (b) Find the normal component of the acceleration vector.

5. (2 pts) Sketch the contour map of the function \( f(x, y) = x^2 + 16y^2 \). Label your graph.