Instructions. Show all work, with clear logical steps. No work or hard-to-follow work will lose points.

1.) (6 points) Consider the function

$$F(x,y) = \sqrt{1 - x^2 - y^2}.$$

- (a) Sketch F(x, y).
- (b) State the domain of F.
- (c) State the range of F.

2.) (10 points) Compute the following limits, or prove the limit does not exist.

(a)
$$\lim_{(x,y)\to(0,0)} \frac{4xy}{3x^2+y^2}$$
 (b) $\lim_{(x,y)\to(-1,1)} \frac{2x^2-xy-3y^2}{x+y}$

3.) (4 points) Compute $\partial f / \partial y$ for

$$f(x,y) = 3y^2 \sinh(\sqrt{x^3 - 1})$$