The Gauss and Weingarten Maps- HW Problems

In problems 1-5 calculate the Gauss map and find its image in S^2 for the given surfaces:

1. $\vec{\Phi}(u,v) = (u,v,uv); \quad (u,v) \in \mathbb{R}^2.$

2. $z = \sqrt{x^2+y^2-1}; \quad$ where $\quad x^2+y^2 > 1.$

3. $\vec{\Phi}(u,v) = (2vcos(u),\ 2vsin(u),\ 2v);$ where
$0 \le u < 2\pi, \quad v \in \mathbb{R}, \quad v \neq 0.$ (This is a cone minus the point (0,0,0).)

4. $\vec{\Phi}(u,v) = \left(u,v,\frac{1}{2}u^2+\frac{1}{2}v^2\right); \qquad u^2+v^2 > 3.$

5. $\vec{\Phi}(u,v) = (u,v,u^2); \quad u > 0, \ \ v \in \mathbb{R}.$