$$z(x,y) = z_0 + \sqrt{r^2 - (x^2+y^2)}, \quad (x^2+y^2) \le r^2$$

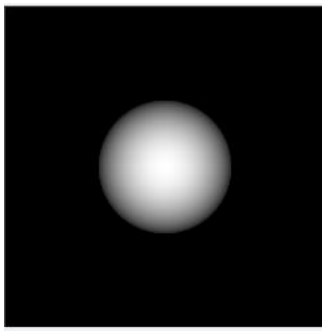
for $\vec{N}(x,y)$, we need to find p and q.

$$p = \frac{\partial z}{\partial x} = \frac{-x}{\sqrt{r^2 - x^2 - y^2}}$$

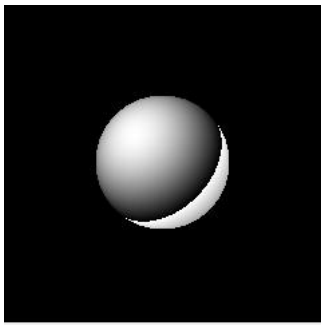
$$q = \frac{\partial z}{\partial y} = \frac{-y}{\sqrt{r^2 - x^2 - y^2}}$$

$$\therefore \vec{N}(x,y) = (-p, -q, 1) = \left(\frac{x}{\sqrt{r^2 - x^2 - y^2}}, \frac{y}{\sqrt{r^2 - x^2 - y^2}}, 1\right)$$

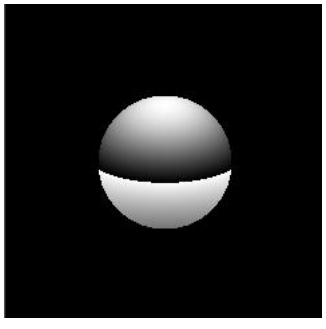
image(a) : S = [0,0,1], r = 50 , a = 0.5, m = 1



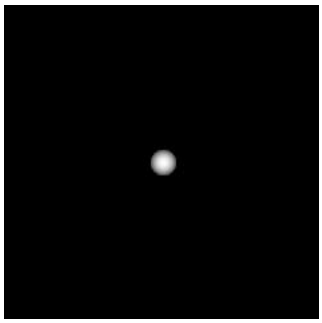
image(b) : S = [1/ √3,1/ √3,1/ √3], r = 50 , a = 0.5, m = 1



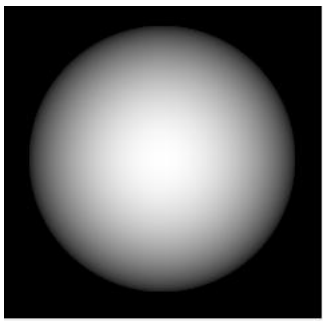
image(c) : S = [1,0,0], r = 50 , a = 0.5, m = 1



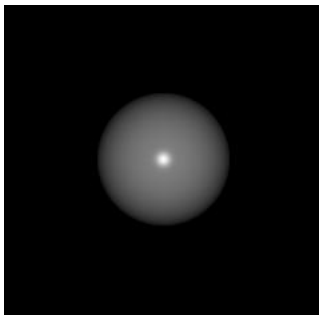
image(d) : S = [0,0,1], r = 10 , a = 0.5, m = 1



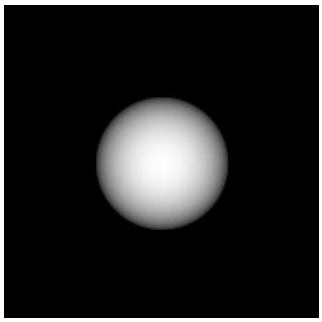
image(e) : S = [0,0,1], r = 100 , a = 0.5, m = 1



image(f) : S = [0,0,1], r = 50 , a = 1, m = 1



image(g) : S = [0,0,1], r = 50 , a = 0.5, m = 1



image(i) : S = [0,0,1], r = 50 , a = 0.5, m = 10000