Homework #2

Problem 2:

Using the expressions provided in class we find

$$\mathbf{a}_1' = \frac{4\pi}{d}\frac{1}{2}(\hat{\mathbf{y}} + \hat{\mathbf{z}} - \hat{\mathbf{x}}), \tag{1}$$

$$\mathbf{a}_2' = \frac{4\pi}{d}\frac{1}{2}(\hat{\mathbf{z}} + \hat{\mathbf{x}} - \hat{\mathbf{y}}), \tag{2}$$

$$\mathbf{a}_3' = \frac{4\pi}{d}\frac{1}{2}(-\hat{\mathbf{x}} + \hat{\mathbf{y}} + \hat{\mathbf{z}}). \tag{3}$$

These three vectors expand a body centered cubic lattice. The side of the cubes in the reciprocal lattice have length $\frac{4\pi}{d}$ where d is the length of the cubes in the original fcc lattice.