Computer Graphics

Homework 5

1. $a\_{1}=\left(5,3,4\right), θ\_{1}=90$

$$\hat{a\_{1}}=\left(\frac{\sqrt{2}}{2},\frac{3\sqrt{2}}{10},\frac{2\sqrt{2}}{5}\right)$$

$$q\_{1}=cos⁡(90/2)+sin⁡(90/2)\left(\frac{\sqrt{2}}{2}i+\frac{3\sqrt{2}}{10}j+\frac{2\sqrt{2}}{5}k\right)=\frac{\sqrt{2}}{2}+\frac{1}{2}i+\frac{3}{10}j+\frac{2}{5}k$$

$$a\_{2}=(0,0,1), θ\_{2}=180$$

$$q\_{2}=cos⁡(180/2)+sin⁡(180/2)\left(0+0+k\right)=k$$

$$q=q\_{1}q\_{2}=\frac{\sqrt{2}}{2}k+\frac{1}{2}ik+\frac{3}{10}jk+\frac{2}{5}k^{2}=-\frac{2}{5}+\frac{3}{10}i-\frac{1}{2}j+\frac{\sqrt{2}}{2}k$$

1. $q=\cos(\left(\frac{θ}{2}\right))+\sin(\left(\frac{θ}{2}\right))\left(xi+yj+zk\right) when a=(x,y,z)$

 $θ=\arccos(\left(-\frac{2}{5}\right))×2=227.2°$

 $\sin(\left(\frac{θ}{2}\right))=$0.72417

 $a=\left(\frac{3}{10}/0.724171,-\frac{1}{2}/0.724171, \frac{\sqrt{2}}{2}/0.72417\right)=\left(0.32738, -0.54564, 0.77165\right)$

1. $A=\left(\frac{1}{\sqrt{2}},\frac{1}{\sqrt{2}},0\right) B=\left(\frac{1}{\sqrt{3}},\frac{1}{\sqrt{3}},\frac{1}{\sqrt{3}}\right) α=\arccos(\left(A∙B\right))=\arccos(\left(\frac{\sqrt{6}}{3}\right))=35.264°$

 $θ\_{1}=\frac{α}{3}=11.753° θ\_{2}=\frac{2α}{3}=23.509°$

 $∵C\left(θ\right)=Acosθ+\left(\frac{B-Acosα}{sinα}\right)sinθ$

 $∴C\left(θ\_{1}\right)=\left(06923, 0.6923, 0.2037\right) C\left(θ\_{2}\right)=(0.6484, 0.6484, 0.3989)$

4.

