Quaternions (based on code 01a)

```
. . .

public class myGame extends VariableFrameRateGame
{  . . .
   private boolean rotate = false, lerp = true;
   private float interpolation = 0.0f, speed = 0.01f;
   private Matrix4f matrixStart = new Matrix4f().identity();
   private Matrix4f matrixInterp = new Matrix4f().identity();
   private Matrix4f matrixEnd = new Matrix4f().identity();
   private Quaternionf quaternionStart = new Quaternionf();
   private Quaternionf quaternionInterp = new Quaternionf();
   private Quaternionf quaternionEnd = new Quaternionf();
   . . .

   @Override
   public void initializeGame()
   {  . . .
      matrixStart.rotateY(1.57f);
      matrixStart.rotateZ(0.7f);

      matrixEnd.rotateY(-0.7f);
      matrixEnd.rotateX(-0.7f);
      matrixEnd.rotateZ(0.7f);
   }

   @Override
   public void update()
   {  if (rotate)
      {  if (interpolation < 1.0f)
         {  interpolation += speed;

            // create quaternions from matrices
            matrixStart.getNormalizedRotation(quaternionStart);
            matrixEnd.getNormalizedRotation(quaternionEnd);

            // interpolate between the two quaternions
            quaternionInterp = new Quaternionf(quaternionStart);
            if (lerp)
               quaternionInterp.nlerp(quaternionEnd, interpolation);
            else
               quaternionInterp.slerp(quaternionEnd, interpolation);

            // convert back to matrix and apply to object
            quaternionInterp.get(matrixInterp);
            dol.setLocalRotation(matrixInterp);
         }
      }
   }
```

```
@Override
public void keyPressed(KeyEvent e)
{  switch (e.getKeyCode())
   {  case KeyEvent.VK_1:
         rotate = false;
         dol.setLocalRotation(matrixStart);
         break;
      case KeyEvent.VK_2:
         rotate = false;
         dol.setLocalRotation(matrixEnd);
         break;
      case KeyEvent.VK_3:
         dol.setLocalRotation(matrixStart);
         interpolation = 0.0f;
         lerp = true;
         rotate = true;
         break;
      case KeyEvent.VK_4:
         dol.setLocalRotation(matrixStart);
         interpolation = 0.0f;
         lerp = false;
         rotate = true;
         break;
   }
   super.keyPressed(e);
}
```