## Sample Test 2b: 3D Transformations and Light

March 29, 2023

- State any simple, reasonable assumption used to arrive at your answer.
- A 'yes' or 'no' answer without reasoning is worth 0 points.
- Zero points if the writing is hard to decipher. Use a black pen if in doubt.
- Indicate with arrow if you use the back of the previous page (last page for page 1).


## 1 Quaternion rotation and perspective

a. (2 points)

Give the quaternion operation for rotating the point $[\mathrm{x}, \mathrm{y}, \mathrm{z}, 2]$ by an angle $\alpha=$


2 Lighting
(4 points) Given is a white diffuse light source at ( $n, 2 n, n, 1$ ), and a unitcube $( \pm 1, \pm 1, \pm 1)$ with vertex normals computed as the average of the surrounding face normals. The scene contains no ambient light (neither from the lighting model nor from the light) and there is noziiñäaion. Use Gouraud shading. Determine the gb light intensity at the point $(0,1,0)$ of the cube. Why is this lighting model unsatisfactory?


