

Sample Test 2a: Basic Objects, Coordinates

March 5, 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 Polyhedra

- (2 points) Specify a regular octa-hedron in *.off* file format (=location + connectivity). Use integer coordinates. Illustrate with a clear drawing.
- (1 points) Explain: What is the fewest number of triangle strips to cover the octa-hedron?
- (4 points) Specify the key operations to draw the octah-hedron using OpenGL (no exact OpenGL commands are needed).

2 Basic Operations on Coordinates

- a. (1 point) Compute the reflection of $\begin{bmatrix} 1 \\ 1 \end{bmatrix}$, across $\begin{bmatrix} 0 \\ 1 \end{bmatrix}$.
- b. (2 points) Define a 4×4 translation matrix T_1 , a rotation matrix R and a second translation matrix T_2 that map the line segment $\overline{\begin{bmatrix} 1 \\ 0 \end{bmatrix} \begin{bmatrix} 2 \\ 0 \end{bmatrix}}$ to the line segment $\overline{\begin{bmatrix} 1 \\ 0 \end{bmatrix} \begin{bmatrix} q \\ 0 \end{bmatrix}}$ of equal length. Clearly indicate your reasoning! What is q ?
- c. (1 point) A color (pink) has the Hue Saturation Intensity values (red, 0.5, 0.5). What are the values (coordinates) in RGB color space?