**Institute of Technology Blanchardstown**

Bachelor of Science in Computing

Computer Graphics (COMP H3016)

Practical Examination – Sample

Weighting: TBD

**Instructions to candidates:** This exam is **closed book** so notes/books cannot be used. Talking and other forms of inter-personal communication are strictly prohibited. The exam is a written exam so scripts should be handed to the invigilator at the end with your name and student number printed clearly on them. Keep handwriting as legible as possible.

**Time allowed: 1 hour**

**Answer ALL questions (total 100 marks)**

**Question 1 (30 marks)**

1. Outline the main steps involved in Bresenham’s circle drawing algorithm.

(15 marks)

1. Write Java code or pseudo code that implements this algorithm.

(15 marks)

**Total (30 marks)**

**Question 2 (40 marks)**

1. What is a rigid body transformation?

(5 marks)

1. Describe two rigid body transformations in 2D computer graphics and list the matrices that will perform these transformations on a 2D point in homogenous coordinates? Give the corresponding matrices in 3D.

(20 marks)

1. Explain the procedure whereby normal vectors to triangular polygons in 3-space can be calculated.

Calculate the normal vector to a polygon with the following vertices:

Vertex 1: (1, 2, 3)

Vertex 2: (4, 2, 7)

Vertex 3: (4, 6, 3)

(15 marks)

**Total (40 marks)**

# Question 3 (30 marks)

1. Explain in detail how 3D world coordinates are mapped to view plane coordinates through viewing transformations and perspective projections. Use diagrams and equations/matrices to support your answer.

**Total (30 marks)**