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)

a) Outline the main steps involved in Bresenham's circle drawing algorithm.

(15 marks)

b) Write Java code or pseudo code that implements this algorithm.

(15 marks)

Total (30 marks)

Question 2 (40 marks)

a) What is a rigid body transformation?

(5 marks)

b) 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)

c) 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)

(a) 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)