# 2015 Winter – Collisions

Q3)

a)

1. BIOT – Binary Image Overlap Testing

128 64 32 16 8 4 2 1

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Ii) There mare collisions in all of the areas marked with an X

iii)

Biot is not used any more as it only operates in 2D and is massively inefficient.

B)

1. An Axis Aligned bounding box is a bounding volume aligned with the axes of the co-ordinate system. Axis aligned bounding boxes are not accurate because of their in-specific shape which causes false positives.
2. An AABB is typically described by a set of coordinates dictating the objects position and its bounding area, which is it’s minimum and maximum size. A collision between AABBs are detected when one AABB’s bounding area is within that of another.
3. AABBs use the Sort and Sweep algorithm to sweep for “Collision Islands” which are much more specifically shaped than AABBs.
4. Asteroid Start X : 100 – 5 = 95  
   Asteroid Finish X : 100 + 5 = 105  
     
   Asteroid Start Y : -150 – 5 = -155  
   Asteroid Finish Y : -150 + 5 = -145  
     
   Asteroid Start Z : 230 – 5 = 225  
   Asteroid Finish Z : 230 + 5 = 235  
     
   Missile Start X : 95 – 2 = 93  
   Missile Finish X : 95 + 2 = 97  
     
   Missile Start y : -160 -10 = -170  
   Missile Finish Y: -160 + 10 = -150  
     
   Missile Start Z: 232 -2 = 230  
   Missile Finish Z : 232 + 2 = 234  
     
   Ship Start X : 305 – 13 = 292  
   Ship Finish X : 305 + 13 = 318  
     
   Ship Start Y : -144 – 2 = -146  
   Ship Finish Y : -144 + 2 = -142  
     
   Ship Start Z : 220 – 10 = 210  
   Ship Finish Z : 220 + 10 = 230

A = Asteroid  
M = Missile  
S = Ship

AX : 95 – 105  
MX : 93 – 97  
SX : 292 – 318

AX and MX are aligned  
  
AY : -155 - -145

MY: -170 - -150  
SY: -146 - -142

AY and MY aligned  
AY and SY aligned  
  
AZ : 225 – 235  
MZ: 230 -234  
SZ: 210 – 230

AZ and MZ and SZ are aligned

The Asteroid and the Missile collide because their X, Y and Z are within the range. The ship does not collide for while it is on the correct Z plane, it is away from the Asteroid and Missile on the X and Y plane.