**West Coast Collaborative**

**Specialist Mathematics Units 3 & 4**

**Investigation 1 2017**

**Complex Plane Dynamics**

**Take Home Section – due Tuesday 14 February**

**Complete this Take Home Component on file paper showing all working out and reasoning. Use of CAS calculator to aid calculation is assumed. On completion of Part 1 there will be a Validation Task (Part 2). For Part 2, CAS calculators will be allowed but no other notes will be permitted.**

**Part 1: Take Home Component**

**Spiral in or out?**

1. What happens when a complex number is multiplied by itself repeatedly?

a) Consider the complex number .

List each complex number in the sequence .

Plot each point on an Argand diagram and connect with straight lines.

Describe the resulting pattern.

b) Repeat this process for the values of below. That is, list the sequence

and plot each set of points on an Argand diagram. Connect the points with straight lines and describe the resulting pattern.

Which complex numbers spiral inwards, which spiral outwards and which do not spiral at all? Generalise your findings. Test your conjecture by choosing several other complex numbers and repeatedly multiplying them by themselves.