Question 1 (6 marks)

(a) Write $-1+i\sqrt{3}$ in $r\operatorname{cis}\theta$ form.

(1 mark)

(b) Consider the complex number $z_1 = x + iy$, where $x > 0$, $y > 0$, and $x > y$.

The complex number z_1, which lies in the first quadrant of the Argand diagram, is shown in Figure 1.

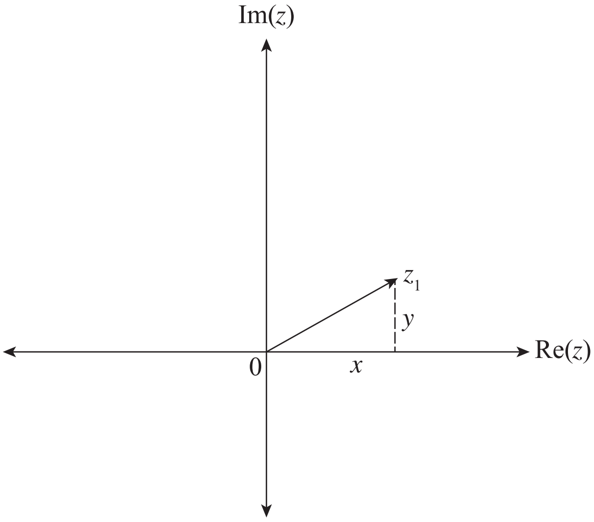

Figure 1

(i) Let $z_2 = (-1+i\sqrt{3})z_1$.

Using part (a), show that $|z_2| = 2|z_1|$.

(1 mark)

(ii) On the Argand diagram in Figure 1, draw z_2. (2 marks)

(c) Use the triangle inequality to show that $|z_1 - z_2| < 3|z_1|$.

(2 marks)