Express each of the following complex numbers in polar exponential form:

a. \( \frac{1}{\sqrt{2}} - \frac{1}{\sqrt{2}}i \);  
b. \( -\sqrt{3} + i \)

Solve for all the roots of the following equation: \( z^4 + 2z = 0 \)

Solve: 1.1: 2 b, c; 4b, e

Sketch the region associated with the following inequality and determine if the region is open, closed, bounded or compact: \( 1 \leq |2z + 4| \leq 3; \) is this region connected? Explain

Show:
\[
\frac{1}{z} = \frac{\bar{z}}{|z|^2}
\]

Use this formula to show that Re\( \left( \frac{1}{z} \right) \) and Re\( z \) have the same sign for all \( z \).

Solve: 1.2 4b, 9a, 10

Evaluate the following limits: a. \( \lim_{z \to 0} \frac{\sin 3z}{z} \)  
b. \( \lim_{z \to 0} \frac{\sin 3z}{\sin z} \)  
c. \( \lim_{z \to \infty} \frac{z^2 + z}{(2z^3 + 3z)} \)

Solve 1.3: 3, 4b,e, 5, 11a

Establish using \( \epsilon, \delta \) arguments, that \( \lim_{z \to -i} z^3 = i \).

Hint: Show \( |z^3 - i| = |z + i||z^2 - iz - 1| = |z + i||z + i - i - 1| = |z + i||z + i - 3| \). Then find \( \delta = \delta(\epsilon) \) so that \( |z^3 - i| < \epsilon \) whenever \( |z + i| < \delta \).