Q1) Show that:

$$(a)\ \lim_{z\to z_0} \operatorname{Re} z = \operatorname{Re} z_0; \qquad (b)\ \lim_{z\to z_0} \bar{z} = \overline{z_0}; \qquad (c)\ \lim_{z\to 0} \frac{\bar{z}^2}{z} = 0.$$

Q2) Show that:

$$(a)\ \lim_{z\to z_0} (az + b) = az_0 + b; \qquad (b)\ \lim_{z\to z_0} (z^2 + c) = z_0^2 + c;$$

$$(c)\ \lim_{z\to 1-i} [x + i(2x + y)] = 1 + i \ (z = x + iy).$$

Q3) Show that:

$$(a)\ \lim_{z\to z_0} \frac{1}{z^n}\ (z_0 \neq 0); \qquad (b)\ \lim_{z\to i} \frac{iz^3 - 1}{z + i}; \qquad (c)\ \lim_{z\to z_0} \frac{P(z)}{Q(z)}.$$

Q4) Show that:

$$\lim_{z\to z_0} z^n = z_0^n$$

when n is a positive integer ($n = 1, 2, \ldots$).