Complex Numbers Ex 13.2 Q3(v)

$$\text{let } z = \frac{(1+i)(2+i)}{3+i}$$

$$= \frac{2+i+i(2+i)}{3+i}$$

$$= \frac{2+i+2i-1}{3+i}$$

$$= \frac{1+3i}{3+i}$$

$$= \frac{(1+3i)}{(3+i)} \times \frac{(3-i)}{(3-i)}$$

$$= \frac{3-i+3i(3-i)}{3^2+1^2}$$

$$= \frac{3-i+9i+3}{9+1}$$

$$= \frac{6+8i}{10}$$

$$= \frac{2(3+4i)}{10}$$

$$\Rightarrow z = \frac{3+4i}{5}$$

Hence

$$\bar{z} = \frac{3-4i}{5}$$

$$= \frac{3}{5} - \frac{4}{5}i$$

Complex Numbers Ex 13.2 Q3(vi)

$$\text{let } z = \frac{(3-2i)(2+3i)}{(1+2i)(2-i)}$$

$$= \frac{3(2+3i) - 2i(2+3i)}{2-i+2i(2-i)}$$

$$= \frac{6+9i-4i+6}{2-i+4i+2}$$

$$= \frac{12+5i}{4+3i}$$

$$= \frac{12+5i}{4+3i} \times \frac{4-3i}{4-3i}$$

$$= \frac{12(4-3i)+5i(4-3i)}{4(4-3i)+3i(4-3i)}$$

$$= \frac{48-36i+20i+15}{16-12i+12i+9}$$

$$= \frac{63-16i}{16+9}$$

$$\Rightarrow z = \frac{63-16i}{25}$$

$$\therefore \bar{z} = \frac{63+16i}{25}$$

$$= \frac{63}{25} + \frac{16}{25}i$$

Complex Numbers Ex 13.2 Q4(i)

If $z = x + iy$ is a complex number, then the multiplicative inverse of z, denoted by z^{-1} or $\frac{1}{z}$

is defined as $z^{-1} = \frac{1}{z}$

$$= \frac{1}{x+iy}$$

$$= \frac{1}{x+iy} \times \frac{x-iy}{x-iy}$$

$$= \frac{x-iy}{x^2+y^2}$$

$$= \frac{x}{x^2+y^2} - \frac{y}{x^2+y^2}i$$

Given

$z = 1 - i$

$$\therefore z^{-1} = \frac{1}{1^2+1^2} - \frac{(-1)}{1^2+1^2} \times i$$

$$= \frac{1}{2} + \frac{1}{2}i$$

Complex Numbers Ex 13.2 Q4(ii)

let $z = \left(1 + i\sqrt{3}\right)^2$

$$= 1^2 + \left(i\sqrt{3}\right)^2 + 2 \times 1 \times i\sqrt{3}$$

$$= 1 - 3 + 2\sqrt{3}i$$

$$= -2 + 2\sqrt{3}i$$

$$\therefore\ z^{-1} = \frac{-2}{\left(-2\right)^2 + \left(2\sqrt{3}\right)^2} - \frac{2\sqrt{3}i}{\left(-2\right)^2 + \left(2\sqrt{3}\right)^2}$$

$$= \frac{-2}{4+12} - \frac{2\sqrt{3}i}{4+12}$$

$$= \frac{-2}{16} - \frac{2\sqrt{3}i}{16}$$

$$= \frac{-1}{8} - \frac{\sqrt{3}i}{8}$$

*********** END **********