Complex Numbers Ex 13.2 Q1(i)

$$\begin{aligned}(1+i)(1+2i) &= 1\times(1+2i)+i(1+2i)\\ &= 1+2i+i+2i^2\\ &= 1+3i-2\\ &= -1+3i\end{aligned}$$

$$\therefore\ (1+i)(1+2i) = -1+3i$$

Complex Numbers Ex 13.2 Q1(ii)

$$\begin{aligned}\frac{3+2i}{-2+i} &= \frac{3+2i}{(-2+i)}\times\frac{(-2-i)}{-2-i} && [\text{Rationalising the denominator}]\\ &= \frac{3(-2-i)+2i(-2-i)}{(-2)^2-(i)^2} && [\because (a+ib)(a-ib)=a^2+b^2]\\ &= \frac{-6-3i-4i+2}{4+1} && [\because -i^2=1]\\ &= \frac{-4-7i}{5}\\ &= \frac{-4}{5}-\frac{7}{5}i\end{aligned}$$

$$\therefore\ \frac{3+2i}{-2+i} = \frac{-4}{5}-\frac{7}{5}i$$

Complex Numbers Ex 13.2 Q1(iii)

$$\begin{aligned}\frac{1}{(2+i)^2} &= \frac{1}{2^2+(i)^2+2\times2\times i}\\ &= \frac{1}{4-1+4i}\\ &= \frac{1}{3+4i}\\ &= \frac{1}{(3+4i)}\times\frac{(3-4i)}{(3-4i)} && [\text{on rationalising the denominator}]\\ &= \frac{3-4i}{3^2+4^2} && [\because (a+ib)(a-ib)=a^2+b^2]\\ &= \frac{3-4i}{25}\\ &= \frac{3}{25}-\frac{4}{25}i\end{aligned}$$

$$\therefore\ \frac{1}{(2+i)^2} = \frac{3}{25}-\frac{4}{25}i$$

Complex Numbers Ex 13.2 Q1(iv)

$$\frac{1-i}{1+i}=\frac{(1-i)}{(1+i)}\times\frac{(1-i)}{(1-i)} \qquad \text{(Rationalising the denominator)}$$

$$=\frac{(1-i)^2}{1^2+1^2} \qquad \left[\because (a+ib)(a-ib)=a^2+b^2\right]$$

$$=\frac{1^2+i^2-2\times i\times 1}{2}$$

$$=\frac{-2i}{2}$$

$$=-i$$

$$=0-i$$

$$\therefore \frac{1-i}{1+i}=0-i$$

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