Complex No

(1) $Z_1 = 3-2i$

$Z_2 = 2+5i$

$Z_1+Z_2 = (3-2i)+(2+5i)$

$= 3-2i+2+5i$

$= 5+3i$

$\rightarrow |Z_1+Z_2| = \sqrt{(x)^2+(y)^2}$

$= \sqrt{(5)^2+(3)^2}$

$= \sqrt{25+9}$

$= \sqrt{34}$

(2) $Z_1 = -3+5i$

$Z_2 = 5-i$

$Z_1-Z_2 = (-3+5i)-(5-i)$

$= -3+5i-5+i$

$= -8+6i$

$|Z_1-Z_2| = \sqrt{(x)^2+(y)^2}$

$= \sqrt{(-8)^2+(6)^2}$

$= \sqrt{64+36}$

$= \sqrt{100}$

$= 10$

(3) $Z = 4-3i$

$\bar{Z} = 4+3i$

(1) $Z+\bar{Z} = (4-3i)+(4+3i)$

$= 4-\cancel{3i}+4+\cancel{3i}$

$= 4+4$

$= 8$

(2) $Z-\bar{Z} = (4-3i)-(4+3i)$

$= \cancel{4}-3i-\cancel{4}-3i$

$= -3i-3i$

$= -6i$

(3) $Z.\bar{Z} = (4-3i)(4+3i)$

$= 16+\cancel{12i}-\cancel{12i}-9i^2$

$= 16-9(-1)$

$= 16+9$

$= 25$

Complex No

4) $Z_1 = 5 - 2i$

$Z_2 = 2 + i$

$Z_1 . Z_2 = (5 - 2i) . (2 + i)$

$= 10 + 5i - 4i - 2i^2$

$= 10 + i - 2(-1)$

$= 10 + i + 2$

$= 12 + i$

$|Z_1 . Z_2| = \sqrt{(x)^2 + (y)^2}$

$= \sqrt{(12)^2 + (1)^2}$

$= \sqrt{144 + 1}$

$= \sqrt{145}$

5) $\left|\frac{5 + 12i}{4 + 3i}\right|$

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

$= \frac{\sqrt{(5)^2 + (12)^2}}{\sqrt{(4)^2 + (3)^2}}$

$= \frac{\sqrt{25 + 144}}{\sqrt{16 + 9}}$

$= \frac{\sqrt{169}}{\sqrt{25}}$

$= \frac{13}{5}$

6) Find value

1) i^{19} $\quad \begin{array}{r} 4 \\ 4\overline{)19} \\ 16 \\ \hline 3 \end{array}$

$= i^3$

$= -i$

2) i^{108} $\quad \begin{array}{r} 27 \\ 4\overline{)108} \\ 8 \\ \hline 28 \\ 28 \\ \hline 0 \end{array}$

$= (i)^0$

$= 1$

3) i^{97} $\quad \begin{array}{r} 24 \\ 4\overline{)97} \\ 8 \\ \hline 17 \\ 16 \\ \hline 1 \end{array}$

$= (i)^1$

$= i$

4) i^{76} $\quad \begin{array}{r} 19 \\ 4\overline{)76} \\ 4 \\ \hline 36 \\ 36 \\ \hline 0 \end{array}$

$= (i)^0$

$= 1$

7) $Z = \frac{3}{5} - \frac{4}{5} i$

$Re(Z) = \frac{3}{5}$

$Im(Z) = \frac{-4}{5}$

8) $\frac{\cos(2\theta) + i \sin(2\theta)}{\cos\theta - i \sin\theta}$

$= \frac{(\cos\theta + i \sin\theta)^2}{(\cos\theta + i \sin\theta)^{-1}}$

$= (\cos\theta + i \sin\theta)^{2 - (-1)}$

$= (\cos\theta + i \sin\theta)^3$

$= \cos 3\theta + i \sin 3\theta$

Complex No

(9) $Z = \dfrac{2+3i}{3+2i}$

$= \dfrac{2+3i}{3+2i} \times \dfrac{3-2i}{3-2i}$

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

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

$= \dfrac{6+5i-6(-1)}{9-4(-1)}$

$= \dfrac{6+5i+6}{9+4} = \dfrac{12+5i}{13}$

$\therefore Z = \dfrac{12}{13} + \dfrac{5}{13}i$

$\therefore \bar{Z} = \dfrac{12}{13} - \dfrac{5}{13}i$

(10) $Z = 2+3i$

$= x + iy$

$\therefore x = 2;\ y = 3$

$Z^{-1} = \dfrac{x - iy}{x^2+y^2}$

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

$= \dfrac{2-3i}{4+9}$

$= \dfrac{2-3i}{13}$

$= \dfrac{2}{13} - \dfrac{3}{13}i$

(11) $Z = \dfrac{1}{4+i}$

$= \dfrac{1}{4+i} \times \dfrac{4-i}{4-i}$

$= \dfrac{4-i}{(4+i)(4-i)}$

$= \dfrac{4-i}{16+4i-4i-i^2}$

$= \dfrac{4-i}{16-(-1)}$

$= \dfrac{4-i}{17}$

$= \dfrac{4}{17} - \dfrac{1}{17}i$