

Q3

$$1) \left(\frac{1+i}{1-i} \right)^3 = ((1+i)/(1-i))^1 \cdot 3 = \begin{pmatrix} -1 \\ 0-i \end{pmatrix} \quad (i^2 \times i) = -1i = -i$$

or

$0-i$

$$2) 3/((1+i)(2+i)) \rightarrow \frac{3}{(3i+1)} \rightarrow \frac{3(-3i+1)}{(3i+1)(-3i+1)} \rightarrow \frac{3(-3i+1)}{10}$$

$\frac{3}{10}(-3i)$

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

↓

$$((1+i)/(1-i)) - ((1+2i)(2+2i)) + ((3-i)/(1+i))$$

So...

$$\begin{aligned} & \left(\frac{(1+i)(1+i)}{(1-i+i)(1+i)} \right) - (2i+1) \times 2(1+i) + \frac{-i+3}{-i+1} \\ & \quad \downarrow \quad \quad \quad \downarrow \quad \quad \quad \downarrow \\ & \frac{(1+i)^2}{2} \quad \quad \quad 2(3i-1) \quad \quad \quad \frac{(-i+3)(1+i)}{(-i+1)(1+i)} \Rightarrow \frac{2(i+2)}{2} \\ & \quad \downarrow \quad \quad \quad \downarrow \quad \quad \quad \downarrow \\ & 1 \quad \quad \quad - (6i-2) + 1+2 \quad \quad \quad i+2 \\ & \quad \quad \quad \downarrow \\ & \quad \quad \quad -4i+4 \\ & \quad \quad \quad \downarrow \\ & \quad \quad \quad 4(-i+1) \end{aligned}$$