① $(5+4i)(3\cos 60 + 3i \sin 60)$

② $(2\cos 20 + 2i \sin 20) = \dfrac{x}{1+i\sqrt{3}}$

③ $(3+4i)^{21}$

④ $\sqrt[4]{1+i}$

① $(5+4i)(3\cos 60° + 3i\sin 60°)$

$\sqrt{41}\ (\cos 39° + i\sin 39°) \qquad = \boxed{3\sqrt{41}\ (\cos 99° + i\sin 99°)}$

② $(2\cos 20° + 2i\sin 20°) = \dfrac{x}{1+\sqrt{3}\,i} \longrightarrow 2(\cos 60° + i\sin 60°)$

$x = (2\cos 20° + 2i\sin 20°)(2\cos 60° + 2i\sin 60°)$

$\boxed{x = 4\cos 80° + 4i\sin 80°}$

③ $(3+4i)^{21}$

$= (5(\cos 53° + i\sin 53°))^{21} = 5^{21}(\cos(21\cdot 53°) + i\sin(21\cdot 53°))$

$= \boxed{5^{21}(\cos 1113° + i\sin 1113°)}$

④ $\sqrt[4]{1+i}$

$= \sqrt{2}\ (\cos 45° + i\sin 45°)$

$2^{\frac{1}{2}\times\frac{1}{4}} = \sqrt[8]{2}$

$\sqrt[8]{2}\cos 11.25° + \sqrt[8]{2}\,i\sin 11.25° \approx 1.1 + 0.2i$

$\sqrt[8]{2}\cos 22.5° + \sqrt[8]{2}\,i\sin 22.5° \approx 1.0 + 0.4i$

$\sqrt[8]{2}\cos 33.75° + \sqrt[8]{2}\,i\sin 33.75° \approx 0.9 + 0.6i$

$\sqrt[8]{2}\cos 45° + \sqrt[8]{2}\,i\sin 45° \approx 0.8 + 0.8i$