Find the value of $(1+i)^{2-i}$ in the form $x+iy$. [98 台大工科海洋甲 4]

[解] $(1+i)^{2-i} = \exp[(2-i)\ln(1+i)] = \exp\{(2-i)\ln[\sqrt{2}e^{i(\frac{\pi}{4}+2k\pi)}]\} = \exp\{(2-i)[\ln\sqrt{2}+i(\frac{\pi}{4}+2k\pi)]\}$

$= \exp[(2\ln\sqrt{2}+\frac{\pi}{4}+2k\pi)+i(\frac{\pi}{2}+4k\pi-\ln\sqrt{2})]$

$= 2\exp(\frac{\pi}{4}+2k\pi)\cdot\exp i(\frac{\pi}{2}+4k\pi-\ln\sqrt{2}) = 2\exp(\frac{\pi}{4}+2k\pi)\cdot\exp i(\frac{\pi}{2}-\ln\sqrt{2})$

$= 2\exp(\frac{\pi}{4}+2k\pi)[\cos(\frac{\pi}{2}-\ln\sqrt{2})+i\sin(\frac{\pi}{2}-\ln\sqrt{2})]$

$= 2\exp(\frac{\pi}{4}+2k\pi)[\sin(\ln\sqrt{2})+i\cos(\ln\sqrt{2})]$