Solution of Recitation - 1.3 **Done by: A. Al-Shallali**

1a) $\mathrm{A}+\mathrm{B}i = \dfrac{\sqrt{-16}+\sqrt[3]{-125}}{\sqrt{-3}\ \sqrt{-27}} = \dfrac{4i-5}{(\sqrt{3}\ i)(3\ \sqrt{3}\ i)} = \dfrac{-5+4i}{-9} = \dfrac{5}{9}-\dfrac{4}{9}i \implies \mathrm{A}=\dfrac{5}{9}\ ,\ \mathrm{B}=-\dfrac{4}{9}$

1b) $\mathrm{A}+\mathrm{B}i = \dfrac{1}{2-3i}\cdot\dfrac{2+3i}{2+3i}-\dfrac{1}{3-2i}\cdot\dfrac{3+2i}{3+2i} = \dfrac{2+3i}{4+9}-\dfrac{3+2i}{9+4} = \dfrac{2}{13}+\dfrac{3}{13}\ i-\dfrac{3}{13}-\dfrac{2}{13}\ i$

$= -\dfrac{1}{13}+\dfrac{1}{13}\ i \implies \mathrm{A}=-\dfrac{1}{13}\ ,\ \mathrm{B}=\dfrac{1}{13}$

2) $z = \dfrac{5\ i^{13}}{4-i} = \dfrac{5\ i^{12}\ i}{4-i}\cdot\dfrac{4+i}{4+i} = \dfrac{(5i)(4+i)}{16+1} = \dfrac{-5+20\ i}{17} = -\dfrac{5}{17}+\dfrac{20}{17}\ i$

$\implies \bar{z} = -\dfrac{5}{17}-\dfrac{20}{17}\ i$

3) $\left(\dfrac{1+i}{1-i}\right)^{17} = \left(\dfrac{1+i}{1-i}\cdot\dfrac{1+i}{1+i}\right)^{17} = \left(\dfrac{1+2i+i^2}{1+1}\right)^{17} = \left(\dfrac{1+2i-1}{2}\right)^{17} = \left(\dfrac{2i}{2}\right)^{17}$

$= i^{17} = i^{16}\ i = i$

4) If $x=i$, then $2x^4+2x^3-x^2+1 = 2i^4+2i^3-i^2+1 = 2-2i+1+1 = 4-2i$ (correct answer is c)

5) $2(3-4i)-4i^{31}+(-2+5i) = 6-8i-4i^3-2+5i = 6-8i+4i-2+5i = 4+i$ (correct answer is a)

6) If $a\in\Re$, $b\in\Re$ and $a+bi = \dfrac{i}{5}(3+4i)(2-3i)(3-4i)(2-3i)$, then find $2a+4b$

Solution: $a+bi = \dfrac{i}{5}(3+4i)(3-4i)(2-3i)^2 = \dfrac{i}{5}(9+16)(4-12i-9) = \dfrac{i}{5}(25)(-5-12i)$

$= (5i)(-5-12i) = 60-25i \implies a=60\,,\ b=-25 \implies 2a+4b = 120-100 = 20$