SN ________ ID ______________ NAME ____

Show all necessary steps for full marks.

Question 1: (5 points)(1.1 Textbook Example): Solve $\dfrac{2x+4}{3}+\dfrac{1}{2}x=\dfrac{1}{4}x-\dfrac{7}{3}$

Solution:

SOLUTION $\dfrac{2x+4}{3}+\dfrac{1}{2}x=\dfrac{1}{4}x-\dfrac{7}{3}$

Distribute to *all* terms within the parentheses.

$12\left(\dfrac{2x+4}{3}+\dfrac{1}{2}x\right)=12\left(\dfrac{1}{4}x-\dfrac{7}{3}\right)$	Multiply by 12, the LCD of the fractions. (Section R.5)
$12\left(\dfrac{2x+4}{3}\right)+12\left(\dfrac{1}{2}x\right)=12\left(\dfrac{1}{4}x\right)-12\left(\dfrac{7}{3}\right)$	Distributive property
$4(2x+4)+6x=3x-28$	Multiply.
$8x+16+6x=3x-28$	Distributive property
$14x+16=3x-28$	Combine like terms.
$11x=-44$	Subtract $3x$. Subtract 16.
$x=-4$	Divide each side by 11.

Question 2: (5 points): Solve for R: $\dfrac{AR-B}{BR-A}=\dfrac{A}{B}+1$

Solution:

$$\frac{AR-B}{BR-A}=\frac{A}{B}+1$$
$$\frac{AR-B}{BR-A}=\frac{A+B}{B}$$
$$ABR-B^2=ABR+B^2R-A^2-AB$$
$$A^2+AB-B^2=ABR-ABR+B^2R$$
$$A^2+AB-B^2=B^2R$$
$$R=\frac{A^2+AB-B^2}{B^2}$$

Question 3: (5 points): $A+iB=\dfrac{\sqrt[3]{-125}+i^{103}-\sqrt{-4}\sqrt{-1}}{(2i-1)-(i+5)}$, $A=?$, $B=?$

Solution:

$$A+iB=\frac{\sqrt[3]{-125}+i^{103}-\sqrt{-4}\sqrt{-1}}{(2i-1)-(i+5)}=\frac{\sqrt[3]{(-5)^3}+i\left(i^2\right)^{51}-\left(\sqrt{4}\right)i\,(i)}{2i-1-i-5}$$
$$=\frac{-5-i+2}{i-6}=\frac{-3-i}{-6+i}=\frac{(-3-i)(-6-i)}{(-6+i)(-6-i)}=\frac{18+3i+6i-1}{36+1}=\frac{17+9i}{37}$$
$$=\frac{17}{35}+\frac{9}{35}i \qquad \text{Answer: } A=\frac{17}{37}\ ,\ B=\frac{9}{37}$$

Question 4: (5 points): If $z=(1-i)^3+i^{15}$, where $i=\sqrt{-1}$, then find the **conjugate** of z .

Solution:

$$z=(1-i)^3+i^{15}=z=(1-i)(1-i)^2+i\cdot i^{14}=(1-i)(1-2i-1)+i\cdot\left(i^2\right)^7$$
$$=-2i(1-i)-i=-2i+2i^2-i=-2-3i \quad\Rightarrow\quad \bar{z}=-2+3i$$

Another Method:

Q16. If $z = (1-i)^3 + i^{15}$, where $i = \sqrt{-1}$, then the **conjugate** of z is:

Sec.(1.3) Complex. numbers

A) $-2+3i$

B) $1+6i$

C) $2-3i$

D) $3i$

E) $-3i$

$z = 1 - 3i + 3i^2 - i^3 + i^{12} \cdot i^3$

$= 1 - 3i - 3 + i + i^3$

$= 1 - 3i - 3 + i - i$

$z = -2 - 3i$

$\bar{z} = -2 + 3i$