King Fahd University of Petroleum and Minerals
Per-Year Math Program
Math 001 - Term 061
Recitation hour (P5 & P6)

Question1

Simplify:

a) $\frac{x}{x-4}-\frac{x^2+6x+9}{x^3+27}\div\frac{x^2+7x+12}{x^3-3x^2+9x}$

Solution

The given expression $= \frac{x}{x-4}-\left[\frac{(x+3)^2}{(x+3)(x^2-3x+9)}\cdot\frac{x(x^2-3x+9)}{(x+3)(x+4)}\right]$

$= \frac{x}{x-4}-\frac{x}{x+4}$

$= \frac{x(x+4)-x(x-4)}{(x-4)(x+4)}$

$= \frac{8x}{(x-4)(x+4)}$

b) $\frac{xy^{-2}-4x^{-1}}{y^{-1}-2x^{-1}}$

Solution

The given expression $= \frac{\frac{x}{y^2}-\frac{4}{x}}{\frac{1}{y}-\frac{2}{x}}\cdot\frac{xy^2}{xy^2} = \frac{x^2-4y^2}{xy-2y^2} = \frac{(x-2y)(x+2y)}{y(x-2y)} = \frac{x+2y}{y}$

c) $\frac{x-1+\frac{2}{x-4}}{x+3+\frac{6}{x-4}}$

Solution

The given expression $= \frac{(x-1)+\frac{2}{x-4}}{(x+3)+\frac{6}{x-4}}\cdot\frac{x-4}{x-4} = \frac{(x-1)(x-4)+2}{(x+3)(x-4)+6} = \frac{x^2-5x+6}{x^2-x-6}$

Question2

Write the number $\dfrac{(\sqrt{-4})i^{23}-\sqrt[3]{-27}}{1+i^{17}}$ in **standard form**.

Solution

The given expression $=\dfrac{2i^{24}+3}{1+i^{17}}=\dfrac{5}{1+i}\cdot\dfrac{1-i}{1-i}=\dfrac{5-5i}{2}=\dfrac{5}{2}-\dfrac{5}{2}i$

Question3

Find the **conjugate** of $z=\dfrac{\sqrt[3]{-27}-\sqrt{-16}}{\sqrt{-3}\sqrt{-27}}$ and write in standard form.

Solution

The given expression $=\dfrac{-3-4i}{-3\sqrt{3}i}\cdot\dfrac{3\sqrt{3}i}{3\sqrt{3}i}=\dfrac{12\sqrt{3}-9\sqrt{3}i}{27}=\dfrac{4\sqrt{3}}{9}-\dfrac{\sqrt{3}}{4}i$

The conjugate is equal to $\dfrac{4\sqrt{3}}{9}+\dfrac{\sqrt{3}}{4}i$

Question4

TRUE or FALSE ?

1. The expression $\left(\sqrt{-2}-\sqrt{2}\right)\left(\sqrt{-2}+\sqrt{2}\right)$ is equal to -4.

Solution

$(\sqrt{2}i-\sqrt{2})(\sqrt{2}i+\sqrt{2})=-2-2=-4\Rightarrow T$

2. The expression $\dfrac{1}{x^{-1}+y^{-1}}$ is equal to $x-y$.

Solution

$\dfrac{1}{x^{-1}+y^{-1}}=\dfrac{1}{\frac{1}{x}+\frac{1}{y}}=\dfrac{xy}{x+y}\Rightarrow F$

3. The expression $\left(x^{-1}+y^{-1}\right)^{-1}$ is equal to $x+y$.

Solution

$(\dfrac{1}{x}+\dfrac{1}{y})^{-1}=\dfrac{xy}{x+y}\Rightarrow F$

4. The expression $i^{60}+i^{61}+i^{62}+i^{63}$ is equal to 0.

Solution

$i^0+i^1+i^2+i^3=0\Rightarrow T$

5. The expression $\left(\dfrac{1+i}{1-i}\right)^{18}$ is equal to -1.

T(check your notes)