

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

Question 1

Simplify:

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

$$= \frac{x^2+4x-x^2+4x}{(x-4)(x+4)} = \frac{8x}{(x-4)(x+4)}, \quad x \neq -3$$

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

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

$x \& x \neq 0, x \neq 2y$

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

$$= \frac{x^2-5x+6}{x-4} = \frac{(x-3)(x-2)}{(x-3)(x+2)} = \frac{x-2}{x+2}, \quad x \neq 3$$

Question 2

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

$$\frac{(2i)i^3 - (-3)}{1+i} = \frac{3+2i}{1+i}$$

$$= \frac{5}{1+i} \cdot \frac{1-i}{1-i} = \frac{5-5i}{1-i^2} = \frac{5-5i}{2} = \frac{5}{2} + (-\frac{5}{2})i$$

Question 3

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

Question 4

TRUE or FALSE?

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

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

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

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

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

$$= \frac{4}{3\sqrt{3}} - \frac{3}{3\sqrt{3}}i$$

$$= \frac{4\sqrt{3}}{9} - \frac{\sqrt{3}}{3}i$$

\Rightarrow Conjugate is

$$\frac{4\sqrt{3}}{9} + \frac{\sqrt{3}}{3}i$$