

QUIZ # 1 ( **Sample Solution** )

1) Write without absolute values and give the reason:

a)  $\left| \frac{|x+4| + |x-6|}{2-2x} \right|, 0 < x < 6$

$$\left| \frac{\overset{\text{positive}}{|x+4|} + \overset{\text{negative}}{|x-6|}}{2-2x} \right| = \left| \frac{x+4 + (-(x-6))}{2-2x} \right| = \left| \frac{10}{2-2x} \right| = \left| \frac{5}{1-x} \right| = \frac{5}{|1-x|} = \begin{cases} \frac{5}{1-x} & \text{if } 0 < x < 1 \\ \frac{5}{-(1-x)} & \text{if } 1 < x < 6 \\ \text{undefined} & \text{if } x = 1 \end{cases}$$

b) If  $x < y$ , then simplify  $\left[ (x^2 - 2xy + y^2) \right]^{\frac{1}{2}} + \left[ (x-y)^3 \right]^{\frac{1}{3}}$

$$= \sqrt{(x-y)^2} + \sqrt[3]{(x-y)^3} = \overset{\text{negative}}{|x-y|} + x-y = -(x-y) + x-y = 0$$

2) If  $x$  and  $y$  are non zero real numbers, simplify

$$\left( \frac{(3xy^2)^0 (3x^{-2}y^{-3})^2}{243x^5y^3} \right)^{\frac{1}{3}} = \left( \frac{3^2x^{-4}y^{-6}}{243x^5y^3} \right)^{\frac{1}{3}} = \left( \frac{1}{27x^{5+4}y^{3+6}} \right)^{\frac{1}{3}} = (27x^9y^9)^{\frac{1}{3}} = \sqrt[3]{(3x^3y^3)^3} = 3x^3y^3$$

3) Simplify  $\sqrt{20x^2y^5} - 3xy\sqrt{45y^3}$  if  $x > 0$  and  $y > 0$

4)

$$= \sqrt{2^2 \cdot 5x^2 (y^2)^2} y - 3xy\sqrt{3^2 \cdot 5y^2 y} = \color{red}{|2xy^2|} \sqrt{5y} - 9xy \color{red}{|y|} \sqrt{5y}, \text{ since } x > 0 \text{ and } y > 0, \text{ then}$$

$$= 2xy^2 \sqrt{5y} - 9xy^2 \sqrt{5y} = -7xy^2 \sqrt{5y}$$

4) Simplify  $\sqrt[4]{32} - \frac{2}{\sqrt[4]{8}}$

$$\sqrt[4]{2^4 \cdot 2} - \frac{2}{\sqrt[4]{2^3}} \cdot \frac{\sqrt[4]{2}}{\sqrt[4]{2}} = 2\sqrt[4]{2} - \frac{2\sqrt[4]{2}}{\sqrt[4]{2^4}} = 2\sqrt[4]{2} - \frac{\cancel{2}\sqrt[4]{2}}{\cancel{2}} = 2\sqrt[4]{2} - \sqrt[4]{2} = \sqrt[4]{2}$$