

King Fahd University of Petroleum and Minerals
Mathematical Sciences Department
Math 003
Quiz # 3
Term(032)

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Student's Name:.....

ID:SEC: ...

1) Factor each of the following expressions completely:

(a)

$$\begin{aligned} &10x^3y - 15xy^3 + 25x^2y^2 \\ &= 5xy(2x^2 - 3y^2 + 5xy) \\ &= 5xy(2x^2 + 5xy - 3y^2) \\ &= 5xy(2x - y)(x + 3y) \end{aligned}$$

(b)

$$\begin{aligned} &4x^2 - 12xy + 9y^2 - 2x + 3y \\ &= (4x^2 - 12xy + 9y^2) + (-2x + 3y) \\ &= (2x - 3y)(2x - 3y) - (2x - 3y) \\ &= (2x - 3y)(2x - 3y - 1) \end{aligned}$$

(c)

$$\begin{aligned} &27(x + y)^3 - 8 \\ &= (3(x + y))^3 - (2)^3 \\ &= (3(x + y) - 2)(9(x + y)^2 + 2 \cdot 3(x + y) + 4) \\ &(3x + 3y - 2)(9x^2 + 18xy + y^2 + 6x + 6y + 4) \end{aligned}$$

2) Simplify each of the following expressions:

(a)

$$\begin{aligned} & \frac{x^2y^{-2} - y^2x^{-2}}{yx^{-1} + xy^{-1}} \cdot (y^{-2} - x^{-2}) \\ &= \frac{\frac{x^2}{y^2} - \frac{y^2}{x^2}}{\frac{y}{x} + \frac{x}{y}} \left(\frac{1}{y^2} - \frac{1}{x^2} \right) \\ &= \frac{\frac{x^4 - y^4}{x^2y^2}}{\frac{y^2 + x^2}{xy}} \left(\frac{x^2 - y^2}{x^2y^2} \right) \\ &= \frac{(x^2 - y^2)(x^2 + y^2)}{x^2y^2} \cdot \frac{xy}{y^2 + x^2} \cdot \frac{x^2 - y^2}{x^2y^2} \\ &= \frac{x^4 - y^4}{x^3y^3} \end{aligned}$$

(b)

$$\begin{aligned} & \frac{1}{x-2} + \frac{2-x}{x^2-4} \div \frac{3}{x+2} \\ &= \frac{1}{x-2} + \frac{-(x-2)}{x^2-4} \cdot \frac{x+2}{3} \\ &= \frac{1}{x-2} - \frac{1}{3} = \frac{5-x}{3(x-2)} \end{aligned}$$