

QUIZ # 2 (B)

1) Determine which is a polynomial and which is not, giving the reason.

- 1) $x^2 + 3x + 2x^{-1}$ not a polynomial because of x^{-1} (neg power)
 2) $\sqrt{x^2 + 3}$ " " " " of $\sqrt{x^2 + 3}$
 3) $\frac{1}{2x^3 - x + 3}$ " " " " of x 's in denominator
 4) $5x^4 - \sqrt{2}x^2 + \sqrt[3]{x^3} = 5x^4 - (\sqrt{2})x^2 + x$ polynomial

2) Factor $3ab^2 + 9a - 2ab^3 - 6ab$

$$= (3ab^2 + 9a) - (2ab^3 + 6ab) = 3a(b^2 + 3) - 2ab(b^2 + 3)$$

$$= (b^2 + 3)(3a - 2ab) = \boxed{a(b^2 + 3)(3 - 2b)}$$

3) Factor if possible or show that it is non-factorable over the integers

$$8x^2 + 3x - 4$$

$$b^2 - 4ac = 9 - 4(8)(-4) = 9 + 64 = 73$$

not a perfect square

\Rightarrow non-factorable over integers

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

$$= \frac{x \frac{1}{y} - \cancel{y} \cdot \frac{1}{x}}{x \frac{1}{y} + 1 - 2 \frac{y}{x}} = \frac{xy \left(\quad \right)}{xy \left(\quad \right)}$$

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

5) Write in standard form the complex number $\frac{\sqrt[3]{-125+i^{11}} - \sqrt{-4}\sqrt{-9}}{1+i}$

$$= \frac{-5 + i^3 - (2i)(3i)}{1+i} = \frac{-5 - i + 6}{1+i} = \frac{1-i}{1+i}$$

$$= \frac{1-i}{1+i} \cdot \frac{1-i}{1-i} = \frac{1-2i-1}{2} = -\frac{2i}{2} = \boxed{-i}$$

6) Factor completely the polynomial $x^4 - 7x^2 - 8$

$$(x^2 - 8)(x^2 + 1)$$

7) If the coefficient of x^3 in the product $(x^3 - kx^2 + x - 5)(3x^2 - 4x + k)$ is 18, find the value of k

The term with x^3 is $kx^3 + 4kx^3 + 3x^3$

$$\Rightarrow 5k + 3 = 18$$

$$5k = 15 \Rightarrow \boxed{k = 3}$$

8) Simplify $\frac{x}{(x-3)^2} + \frac{x^2+2x}{x+5} \div \frac{(x+2)(x-3)}{x+5}$

$$\frac{x}{(x-3)^2} + \frac{x(x+2)}{x+5} \cdot \frac{(x+5)}{(x+2)(x-3)}$$

$$= \frac{x}{x-3} \left(\frac{1}{x-3} + 1 \right) = \frac{x}{x-3} \left(\frac{1 + x - 3}{x-3} \right)$$

$$= \boxed{\frac{x(x-2)}{(x-3)^2}}$$