MHF4U: Practice Test –Factor and Remainder Theorems

Name: _____ Mark:

1. Factor the following polynomials fully.

A) $x^2(y+1)-16x(y+1)+48(y+1)$

$=(y+1)(x-12)(x-4)$

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

$=(2x-3)(x-1)(2x+1)$

C) $2xy^6-16x^4$

$=2x(y^2-2x)(y^4+2xy^2+4x^2)$

D) $x^4-2+x-2x^3$

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

E) $(2x+1)^2-(3x-5)^2$

$=(5x-4)(-x+6)$

$or=-(x-6)(5x-4)$

F) $3x^2+xy-10y^2$

$=(3x-5y)(x+2y)$

G) $\frac{1}{8}x^3+\frac{1}{64}$

$=\left(\frac{1}{2}x+\frac{1}{4}\right)\left(\frac{1}{4}x^2-\frac{1}{8}x+\frac{1}{16}\right)$

$or=\frac{1}{64}(2x+1)(4x^2-2x+1)$

H) $9x^2-4y^2+4y-1$

$=(3x+2y-1)(3x-2y+1)$

2. Determine the quotient and remainder for each of the following. ***(Note: Use any method you wish)***

A) $(6x^3-19x^2+18x-22)\div(2x-5)$ [3]

Quotient $=3x^2-2x+4$ Remainder $=-2$

B) $(t^4-17t^2-36t-20)\div(t^2-3t-10)$ [3]

Quotient $=t^2+3t+2$ Remainder $=0$

3. Determine the remainder if $2x^3 - 5x^2 - 11x - 4$ is divided by: [KU3]

A) $\div (x-4)$

$\boxed{\text{Remainder} = 0}$

B) $\div (3x+1)$

$\boxed{\text{Remainder} = -\frac{26}{27}}$

4. Are any of the divisors above factors of the polynomial function $2x^3 - 5x^2 - 11x - 4$? Explain why?

Yes (x-4) is a factor of polynomial because there is no remainder =0 (Factor Theorem)

5. If $(x-2)$ is a factor of $f(x) = 2x^3 + kx^2 + 4x + 4$

A) Determine the value of k.

$\boxed{k = -7}$

B) Determine all other factors of $f(x)$.

$\boxed{= (x-2)^2(2x+1) \text{ or } = (x-2)(x-2)(2x+1)}$

6. The polynomial $mx^3 - 5x^2 + (m+n)x - 9$ has a remainder of -51 when divided by $(x+2)$ and a remainder of 9 when divided by $(x-3)$. What are the values of both m and n?

$\boxed{m = 2 \;\&\; n = 1}$

7. Complete the table below. Show all work for full marks.

Dividend	Divisor	Quotient	Remainder
$3x^3 - x^2 - 12x + 7$	$3x - 1$		3
	$x^2 + 1$	$x^3 - 3x^2 - 5$	-9

$\boxed{\text{Quotient} = x^2 - 4}$

$\boxed{\text{Dividend} = x^5 - 3x^4 + x^3 - 8x^2 - 14}$