Serial #: ________ ID ______________ NAME ____

Show all necessary steps for full marks.

Question 1: (4 points) (R.3 Textbook Exercise 94):

If $\dfrac{k^4-4k^2+2k+5}{k^2+1}=Q(x)+\dfrac{R(x)}{k^2+1}$, find $Q(x)=?$ and $R(x)=?$

Solution:

$$k^2+1\,\overline{)\,k^4-4k^2+2k+5}\quad\text{quotient: } k^2-5$$

$$\underline{-(k^4+k^2)}$$

$$-5k^2+2k+5$$

$$\underline{-(-5k^2-5)}$$

$$2k+10$$

$\boxed{Q(x)=k^2-5}$ and $\boxed{R(x)=2k+10}$

$$\frac{k^4-4k^2+2k+5}{k^2+1}=k^2-5+\frac{2k+10}{k^2+1}$$

Question 2: (6 points): Given the polynomial $(3x^2-2)^2-(2x^2-x-3)(2x^2-x+3)$

(a): Write the polynomial in standard form.

(b): Write down the following:

The leading coefficient	The constant Term	The coefficient of x^2	Degree

Solution (a):

$$f(x)=(3x^2-2)^2-(2x^2-x-3)(2x^2-x+3)$$

$$=9x^4-12x^2+4-[(2x^2-x)-3][(2x^2-x)+3]$$

$$=9x^4-12x^2+4-\left[(2x^2-x)^2-3^2\right]$$

$$=9x^4-12x^2+4-\left[4x^4-4x^3+x^2-9\right]$$

$$=5x^4+4x^3-13x^2+13$$

(b):

The leading coefficient	The constant Term	The coefficient of x^2	Degree
5	13	-13	4

Question 3: (5 points) (R.4 Textbook Exercise 97): Factor $64+(3x+2)^3$

Solution:

97. $64+(3x+2)^3$

$$=4^3+(3x+2)^3$$

$$=\left[4+(3x+2)\right]\left[4^2-(4)(3x+2)+(3x+2)^2\right]$$

$$=\left[4+(3x+2)\right]\left[\begin{array}{l}4^2-(4)(3x+2)\\ \quad +9x^2+12x+4\end{array}\right]$$

$$=(4+3x+2)(16-12x-8+9x^2+12x+4)$$

$$=(3x+6)(9x^2+12)$$

$$=3(x+2)(3)(3x^2+4)=9(x+2)(3x^2+4)$$

Question 4: (5 points) (R.4 Textbook Exercise 65): Factor $27y^9+125z^6$

Solution:

65. $27y^9+125z^6$

$$=(3y^3)^3+(5z^2)^3$$

$$=(3y^3+5z^2)\left[(3y^3)^2-(3y^3)(5z^2)+(5z^2)^2\right]$$

$$=(3y^3+5z^2)(9y^6-15y^3z^2+25z^4)$$