Long Division and Synthetic Division

Long Division

1. Divide $2x^4 + 3x^3 - 6x^2 + 8x + 1$ by $x^2 + 3$.

2. Divide $x^3 + 8$ by $x + 2$.

3. Divide $6x^3+19x^2-116x-84$ by $3x+2$. Use the result to factor the polynomial completely.

Synthetic Division - A method used to divide polynomials when the divisor is of the form (x - k).

4. Divide $3x^3+6x^2-x+4$ by $x-4$.

5. Divide $-4x^5+2x^3+4x^2-x-1$ by $x+2$.

6. Use synthetic division to show that $(x-2)$ is a factor of $3x^3-7x^2-2x+8$.

   Use the result to find the remaining factors of the function.