ALGEBRA 2 HONORS
PROBLEM SET 21

DUE DATE: DECEMBER 4, 2023

Question 1. Compute the quotient and remainder of the following division:

$$\frac{6 + 5x^5 + 4x^4 + 3x^3 + 2x^2 + x}{x + 1}$$

(Hint: be careful with the set up.)

Question 2. Suppose $g(x) = 6x^3 + ax^2 - 4ax + b$ has factors $(x + \frac{2}{3})$ and $(x - 2)$ (e.g. $\frac{g(x)}{(3x+2)}$ and $\frac{g(x)}{(x-2)}$ leave remainder 0). What is the value of a and b?

Question 3. Let $f(x) = x^4 + ax^3 + bx^2 + cx + d$ be a polynomial of degree 4 with zeros at $x = 4i$ and $x = -\sqrt{2}$. What is a, b, c, d?

Question 4. Let $f(x)$ be a polynomial of degree 5 with zeros at $x = 1$, $x = \sqrt{2} + 3i$ and $x = 4 + \sqrt{5}$.

(a) How many zeros does $f(x)$ have?
(b) Find the missing zeros.

Question 5. Given that $f(x) = x^4 + 5x^3 - 11x^2 - 33x - 18$ has factors $(x - 3)$ and $(x + 1)$, fully factor out $f(x)$ and find all zeros.