ALGEBRA 2
PROBLEM SET #20

DUE DATE: NOVEMBER 30, 2023

Question 1. Find the quotient and remainder when $p(x) = 3x^4 - 2x^3 + 10x - 2$ is divided by $x + 1$.

Question 2. Find the quotient and remainder when $f(x) = 3 + 2x + 2x^4$ is divided by $x - 4$.

Question 3. Find the value of k if $p(x) = x^3 + kx^2 - 3x + 6$ has a remainder of 0 when divided by $x - 2$.

Question 4. Alice and Bob are creating polynomials:

$$A(x) = -x^{20} + \pi x^{18} + 3x - 4$$
$$B(x) = 1 - x + \frac{x^2}{2} + \frac{x^3}{3} - \frac{x^4}{4} - \frac{x^5}{5}$$

(a) How many times will $A(x) = B(x)$ in the real numbers $\mathbb{R}$?
(b) How many times will $A(x) = B(x)$ in the complex numbers $\mathbb{C}$?
(c) Bob claims he can find 6 numbers $a_1, a_2, a_3, \ldots, a_6$ such that

$$B(a_1) = B(a_2) = B(a_3) = \cdots = B(a_6) = 100.$$

Prove that Bob is lying.