Name: _____

MATH 101
Fall 2023
HW 18: Due 12/11

"Go down deep enough into anything and you will find Mathematics."
–Dean Schlicter

Problem 1. (10pt) Consider the polynomial $f(x) = (x-1)(x+3)(x^2+4)(x^2-9)$.

(a) What is the degree of $f(x)$?

(b) How many real zeros does $f(x)$ have?

(c) How many complex zeros does $f(x)$ have?

(d) Does $f(x)$ have a maximum or a minimum? Explain.

Problem 2. (10pt) Determine the quadratic polynomial that has a root at $x = 1 - 3i$ and has y-intercept 5.

Problem 3. (10pt) Suppose that $f(x)$ is a degree four polynomial (quartic polynomial) with $f(-3) = f(1) = f(4) = f(6) = 0$ and $f(0) = -7$. Find the polynomial $f(x)$.

Problem 4. (10pt) Suppose $f(x)$ is a real quartic polynomial whose graph is given below. How many real zeros does $f(x)$ have? How many complex zeros does $f(x)$ have? Find $f(x)$.