Name: _____

MATH 101
Spring 2024
HW 20: Due 04/24

"Okay. No hard feelings, but I hate you. Not joking. Bye."
— Gina Linetti, Brooklyn 99

Problem 1. (10pts) Consider the polynomial $f(x) = x^3(x^2+1)(x+4)^2(x-5)(x+8)^3$.

(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. (10pts) Determine the real quadratic polynomial that has a root at $x = 1 + 3i$ and has y-intercept 1.

Problem 3. (10pts) Suppose that $f(x)$ is a degree five polynomial (quintic polynomial) with $f(-1) = f(2) = f(4) = f(5) = 0$ and $f(0) = -7$. Find the polynomial $f(x)$.

Problem 4. (10pts) 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 $f(x)$.