MPS21XH - Polynomials Problem Set 1
Mr. Jaishankar

For questions 8,9,11,12, and 13, you **must use** the formulas for the sum and product of the roots of a quadratic polynomial. DO NOT assume anything about the coefficients.

Complex Review:

1.) If $(5-3i)^2+(7+4i)^2 = a+bi$, compute $a+b$.

2.) Let $z_1 = \frac{1-i}{1+i}$ and let $z_2 = \frac{1+2i}{1-i}$.

a.) Find $\overline{z_1}$. - recall that $\overline{z}$ is the conjugate of z.
b.) Find $|z_1 * z_2|$.

3.) The complex number $z = a+bi$ satisfies $z+|z| = 2+8i$. Compute $|z|$.

4.) Let $z \in \mathbb{C}$ such that $Im(z) = 164$ and $Re(z) = a$. Let $n \in \mathbb{N}$ such that $\frac{z}{z+n} = 4i$. Compute n.

5.) Let $z = 9+bi, b \in \mathbb{N}$. If $Im(z^2) = Im(z^3)$, compute b.

6.) Let $z = 3i^3 - 2ai^2 + (1-a)i + 5, a \in \mathbb{R}$. If $Im(z) = 0$, find a.

7.) Let $P(x) = x^2 + 4ix - 13$. Without using the quadratic formula, solve $P(x) = 0$.

Quadratic Polynomials:

8.) One root of $x^2 + bx + 1 = 0$ is twice the other. Compute all possible values of b.

9.) Let a and b be the roots of $P(x) = 5x^2 + 14x - 18$. Compute $(a-2)(b-2)$ **without** finding the values of a and b.

10.) If $4x^2 + ax + 8x + 9 = 0$ has exactly one solution in x, find **all** possible values of a.

11.) The roots of $x^2 - 26x + N = 0$ are r and s. If $19r + 94s = 1994$, compute N.

12.) Let p and q be the roots of $x^2 - Sx + 8 = 0$. If $p - q = 2$, compute all possible values of S.

13.) Let $f(x) = x^2 + mx + n$ and $g(x) = x^2 + px + m, m, n, p \neq 0$. If the roots of $f(x) = 0$ are twice the roots of $g(x) = 0$, compute $\frac{n}{p}$.