1. Reid is twice as old as Gabe. Four years ago, Gabe was twice as old as Dani. In 10 years, Reid will be twice as old as Dani. How many years old is Reid now?

2. Let $P(x) = x^6 + ax^5 + bx^4 + x^3 + bx^2 + ax + 1$. Given that 1 is a root of $P(x) = 0$ and -1 is not, what is the maximum number of distinct real roots that P could have?

3. If $a, b, c \in \mathbb{C}$ and $a + b + c = ab + bc + ac = abc = 1$, find a, b, c. (The order in which you write your answers does not matter.)

4. Find $x^4 + y^4 + z^4$, given that
$$\begin{cases} 0 = x + y + z \\ 1 = x^2 + y^2 + z^2 \end{cases}$$

5. The product of a 13x5 matrix and a 5x13 matrix contains the entry x in exactly two places. If $D(x)$ is the determinant of the matrix product, $D(x = 0) = 2008$, $D(x = -1) = 1950$, and $D(x = 2) = 2142$. Find $D(x)$.

6. For how many integers k, with $0 \leq k \leq 2008$, does $x^2 - x - k = 0$ have integer solutions for x?

7. Find all ordered pairs of positive integers (p, q) such that $2p^2 + q^2 = 4608$.

8. How many monic polynomials $P(x)$ are there with $P(x)Q(x) = x^4 - 1$ for some other polynomial $Q(x)$, where the coefficients of P and Q are in $\mathbb{C}$?

9. Find the number of distinct ordered integer pairs (x,y) with $x + y - xy = 43$.

10. Evaluate
$$\sum_{k=1}^{\infty} \frac{k}{5^k}.$$