# MATH 61-02: WORKSHEET 6 (§4.4)

(W1) How many solutions does the equation $a + b + c + d + e = 2016$ have, if...

    (a) $a, b, c, d, e$ are all positive integers?

    (b) $a, b, c, d, e$ are all non-negative integers?

    (c) $a, b, c, d, e$ are all integers $\geq 10$? (Hint: let $A = a - 9$, $B = b - 9$, etc.)

    (d) $a, b, c, d, e$ are all even nonnegative integers?

    (e) $a, b, c, d, e$ are all integers (possibly negative) less than or equal to 2000?
        (Hint: here, $a \leq 2000$. Find a transformed variable $A \geq 1$ to set up stars-n-bars.)

(W2) Recall that a *quadratic polynomial* in the variable $x$ is an expression of the form $ax^2 + bx + c$. A *cubic polynomial* has degree three instead of two.

(a) What is the form of an arbitrary cubic polynomial in $x$? If your polynomial is called $g(x)$, evaluate $g(0)$, $g(1)$, $g(-1)$, and $g(2)$ in terms of the coefficients you used in your expression.

(b) How many cubic polynomials $f(x)$ with positive integer coefficients satisfy $f(1) = 9$?

(c) How many degree 6 polynomials $f(x)$ with positive integer coefficients satisfy $f(1) = 30$ and $f(-1) = 12$?