Math 74, Week 4

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1 Lec Mon, 1c

1.1 a

Since each term is the product of x^a, y^b, z^c, and $a + b + c = 2020$, we can simplify this problem into dogs and biscuits. $\binom{2020+3-1}{3-1} = \binom{2022}{2}$

1.2 b

Before combining, we expand each term by picking one variable from each of the 2020 $(x + y + z)$ multiplied together. So we have 3^2020.

1.3 c

We can reach the same result by subtracting the amount where there is only x, or only y, or only z, or xy, xz, yz.
For the first three, there is only 1 way for that to happen since that variable has to be raised to 2020. For xz, we have $a + b = 2020$, feeding 2018 biscuits to 2 dogs. We need to subtract 2 since we have already counted having only one term. Therefore $\binom{2018+2-1}{2-1} = 2019$.
Adding them together we have $1 \times 3 + 2019 \times 3 = 6060$