

MATH413 HW 5

due **Mar 7** before class

1: (*P. 156, #29*) Find and prove a formula for

$$\sum_{r,s,t \geq 0 \text{ and } r+s+t=n} \binom{m_1}{r} \binom{m_2}{s} \binom{m_3}{t}$$

where the summation extends over all nonnegative integers r, s and t with sum $r + s + t = n$.

2: Find

- (a) the coefficient of x^3y^7 in the expansion of $(2x + y)^{10}$;
- (b) the coefficient of $x^{13}y^{77}$ in the expansion of $(3x - 2y)^{90}$;
- (c) the coefficient of $x_1^3x_2^3x_3x_4^2$ in the expansion of $(x_1 - x_2 + 2x_3 - 2x_4)^9$

3: (*P. 160, # 46*) Use Newton's binomial theorem to approximate $\sqrt{30}$.

4: (*P. 198, # 2*) Find the number of integers between 1 and 10,000 inclusive that are not divisible by 4, 6, 7, or 10.

5: (*P. 198, # 6*) A bakery sells chocolate, cinnamon, and plain doughnuts and at a particular time has 6 chocolate, 6 cinnamon, and 3 plain. If a box contains 12 doughnuts how many different options are there for a box of doughnuts?

6: (*P. 198, # 8.*) Determine the number of solutions of the equation $x_1 + x_2 + x_3 + x_4 + x_5 = 14$ in positive integers x_1, x_2, x_3, x_4 and x_5 not exceeding 5.