1. If there are 25 students in a class, and 25 desks, how many different ways are there to assign each student their own desk? $25!$

2. If there are 68 students in this class and 100 seats in the room, how many different ways are there to assign each student their own desk? $\frac{100!}{32!}$

3. Mr. Miller is assigning classroom jobs to his students. If there are 5 different jobs and 32 students, and no student can have more than one job, how many different possible ways can he assign jobs? $\frac{32!}{27!}$

4. Mr. Miller wants to choose 3 students to be classroom monitors. Each of the three jobs is exactly the same. $\binom{32}{3} = \frac{32!}{3! \cdot 29!}$

5. Jessie is planning a vacation. She must decide whether to travel to Boston, New York, or Washington D.C. She can travel by bus, train, car, or airplane. In each city, she can either stay with a friend, in a hostel, or in a hotel. How many different vacations can she plan? $3 \cdot 4 \cdot 3$

6. Peter is deciding which friends to invite to a dinner party. He has room to invite 5 people, but has made a list of 7 friends. How many different guest lists are possible? $\binom{7}{5} = \frac{7!}{5!\,2!}$

7. You are choosing a combination for your P.E. locker. Your lock requires a 3-digit combination, using the numbers 0 through 59. No two consecutive numbers can be the same, but numbers can be repeated non-consecutively. (For example, the combination 6-6-59 would not be allowed, but 6-59-6 is allowed.) How many different combinations are possible? $60 \cdot 59 \cdot 59$

8. The Mad Hatter is getting dressed. He has a choice of three waistcoats, four pairs of trousers, twelve hats, and two pairs of boots. How many different outfits can he create? $3 \cdot 4 \cdot 12 \cdot 2$

9. A teacher is writing a test for her students. She has a question bank of 150 questions, and wants to include 30 of them on the exam. Assuming that the order of the questions doesn't matter, and no question is repeated, how many different tests can she create? $\binom{150}{3}$

10. Use the binomial theorem to rewrite $(2x - y)^5$ so that it doesn't include any numbers that look like $\binom{n}{k}$.

$$\boxed{(2x)^5(-y)^0 + 5(2x)^4(-y)^1 + 10(2x)^3(-y)^2 + 10(2x)^2(-y)^3 + 5(2x)(-y)^4 + (-y)^5}$$

OR (=)

$$\boxed{32x^5 - 80x^4y + 80x^3y^2 - 40x^2y^3 + 10xy^4 - y^5}$$

1
1 1
1 2 1
1 3 3 1
1 4 6 4 1
1 5 10 10 5 1