550.420 Intro to Probability - Spring 2017 **Fun exercises**
Will not be collected.

Exercises marked with an asterisk are a little "tricky"; can you figure them out??

1. Six male and six female dancer perform the Virginia reel. This dance requires that they form a line of six male/female pairs. How many such arrangements are there?

2. An elevator containing five people can stop at any of seven floors. What is the probability that no two people get off the same floor? Assume that the occupants act independently and that all floors are equally likely to be chosen by each occupant.

3. (a) A balanced coin is tossed five times. What is the probability of getting a sequence with exactly three consecutive heads?
(b) Same question but the coin is tossed six times.

4. A standard deck of 52 cards is shuffled thoroughly and turned over one by one. What is the probability that all the aces are next to each other?

5.* A standard deck of 52 cards is shuffled thoroughly and turned over one by one. What is the probability that all the aces occur before all the kings?

6. A standard deck of 52 cards is shuffled thoroughly and turned over one by one. What is the probability that the 4th king happens by the 10th card?

7. How many ways are there to place n indistinguishable balls into n distinguishable boxes so that exactly one box is empty?

8. A poker player is dealt three spades and two hearts. She discards the two hearts and draws two more cards. What is the probability she draws two more spades?

9. A box has 5 red, 3 blue and 2 yellow marbles. Three marbles are drawn with replacement. What is the probability that all three marbles are different colors?

10. Three balanced dice are tossed. Let A_i be the event that a 6 appears on the ith toss. Compute $P(A_1 \cup A_2 \cup A_3)$.

11. Five cards are dealt from a standard deck of 52 cards. What is the probability the hand contains the king of spades, one other king, and exactly 2 queens?

12. (a non-counting type problem...) A system has two components placed in series so that the system fails if either of the components fails. The second component is twice as likely to fail as the first. If the two components operate independently, and if the probability that the entire system will fail is .28, then what is the probability that the first component will fail?