Problem set 3, assigned on 10/6/19

1. Three karate masters come to the martial art school where 20 students are apprenticing in karate. The school teacher must choose 3 students to pair up with the masters for individual sessions. In how many ways can these 3 pairs be chosen?

2. Pirates Ash, Bash, Cash, and Dash have 7 identical gold coins. In how many ways can they divide these coins if each pirate must get at least 1 coin?

3. In how many ways can you arrange the digits 1, 2, 3, 4, 5 into a 5-digit number such that:
(a) All the even digits are placed next to each other,
(b) The even digits are separated from each other by at least 1 odd digit.

4. Strangestun Air Force has 10 spy planes.
(a) On Monday, 4 of these 10 planes should y a secret mission to Fingalia. In how many ways can these 4 planes be chosen?
(b) On Tuesday, 4 of these 10 planes should y a secret mission to Tartaria, 4 planes to Rosalia, and 2 planesto Santinia. In how many ways can these planes be chosen and assigned to the missions?

5. Tim the Ant lives on a 3D cubical grid (lattice) with dimen- sions $4 \times 4 \times 1$ (see the picture). In how many ways can Tim crawl from the lower left front corner (Point A) to the upper right back corner (Point B) of the lattice if he wants to take the shortest route possible?