MATH 5: HANDOUT 17
BEGINNING PROBABILITY – 2.

HOMEWORK

1. Recall that a roulette has 37 slots: 0 through 36. Among slots 1–36, half are red, the other half black (zero has no color). What is the probability of
  (a) getting a red (on a single run of roulette)
  (b) getting a red, then black, then 0 (on 3 successive runs)
  (c) getting red 15 times in a row?
  (d) getting this sequence of colors: RRRBRBRBBRBBRBR (also of length 15)?

2. A hunter is shooting ducks. Probability of hitting a duck with one shot is $p = 1/3$.
  (a) What is the probability of missing the duck (with one shot)?
  (b) He makes 5 shots. What is the probability that he misses all five?
  (c) What is the probability that out of 5 shots, he will hit at least once? Will this probability double if he makes 10 shots? (You can use the calculator for computing the answers)
  (d) What is the probability that out of 5 shots, he will hit exactly once? Will this probability double is he makes 10 shots?
  *(e) What is the probability that out of 5 shots, he will hit at least twice? Will this probability double if he makes 10 shots? (You can use the calculator for computing the answers)
  *(f) What is the probability that out of 5 shots, he will hit exactly twice? Will this probability double if he makes 10 shots? (You can use the calculator for computing the answers)

3. Supposing that there are equal chances of a boy or a girl being born, what is the probability that at least one of the first five babies born next Saturday morning at the St. Charles Hospital will be a girl? That all five will be girls?

4. At a fair, they offer you to play the following game: you are tossing small balls in a large crate full of empty bottles; if at least one of the balls lands inside a bottle, you win. Unfortunately, it is really impossible to aim, so the game is just a matter of luck (or probability theory): every ball you toss has a 20% probability of landing inside the bottle.
  (a) If you are given three balls, what is the probability that all three will be hits? That all three will be misses? That at least one will be a hit?
  (b) Same questions for five balls.
  (c) They charge you 2 dollars for 3 balls, or 3 dollars for 5 balls. Which is a better deal? [Considering only from the point of view of the chances of winning, not the fun you are getting]

5. In one kind of lottery, they put balls with numbers 1 through 100 in a bag and then draw six balls at random (drawn ball is put aside and not returned to the bag). To win the lottery, one needs to guess all six numbers in correct order. What is the probability of this?