Homework 1 Key

Math 530/630

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Due: 10/24/2017

1. A coin is tossed three times and the sequence of heads and tails is recorded.
   a. List the sample space.
   b. List the elements that make up the following events:
      - A = at least two heads;
      - B = the first two tosses are heads;
      - C = the last toss is a tail.
   c. List the elements of the following events:
      - complement of A,
      - $A \cap B$,
      - $A \cup C$.

Answer

Note, for all answers in this homework that don't explicitly call for R, I don't require or expect that you use R. I use it on most problems just for the sake of convenience and so you can follow the calculations.

```
a) hhh, ttt, hht, tth, htt, hth, tht, thh
b) 1) hhh, hht, hth, thh
   2) hhh, hht
   3) ttt, hht, htt, tht
c) 1) ttt, tth, htt, tht
   2) hhh, hht
   3) ttt, hht, htt, tht, hhh, hth, thh
```

2. In a city, 65% of people drink coffee, 50% drink tea, and 25% drink both.
   a. What is the probability that a person chosen at random will drink at least one of coffee or tea?
   b. Will drink neither?

Answer

```
# a) .9
coffee <- .65
tea <- .5
both <- .25
```

Recalling that $P(A \cup B) = P(A) + P(B) - P(A \cap B)$:

```
coffee_or_tea <- coffee + tea - both
coffee_or_tea
```

```
## [1] 0.9
```

```
# b) .1
```

Recalling that $P(A^c) = 1 - P(A)$:

```
1 - coffee_or_tea
```

```
## [1] 0.1
```

3.

```
a), b)  Some variation on this with 15, 30, 60, 100
x <- rnorm(15)
#c)
```

Something along the lines of: For small values of n, samples drawn from the normal distribution may not have the classic "bell shaped" distribution. qq-plots may not fall precisely on a straight line.