

Homework 01 Solution
STAT 509 Statistics for Engineers
Summer 2017 Section 001
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Question 01

There is going to be 2 exams in this course. Each exam resulted in pass (P) or fail then (F).

- a Write a set S with all possible outcome. Note that, this set is the sample space.
- b The event A denotes passing in both exams. Express A in set notation.
- c The event B denotes passing in at least one exams. Express B in set notation.
- d Find $A \cup B$ and $A \cap B$.
- e Assuming passing and failing are equally likely, find the probability of the event A and B .

Solution:

- (a) $S = \{PP, PF, FP, FF\}$.
- (b) $A = \{PP\}$.
- (c) $B = \{PP, PF, FP\}$.
- (d) $A \cup B = \{PP, PF, FP\}$. $A \cap B = \{PP\}$.
- (e) $P(A) = \frac{n_A}{n_S} = \frac{1}{4}$. $P(B) = \frac{n_B}{n_S} = \frac{3}{4}$.

Question 02

Conduct a simulation with tossing a “biased” 1000 times. In each toss, the probability to get head is 80%. Generate a plot to demonstrate the change of proportion of heads over time using R (similar to the plot in chapter 2 notes page 9). (Hint: `x <- rbinom(n=1000,size=1,prob=0.8)`).

Solution:

```
nsim = 1000
x <- rbinom(n=nsim,size=1,prob=0.8)
y <- cumsum(x)
p <- y/1:nsim
plot(1:nsim, p, main = 'Proportion of heads; n=1000, p=0.8', xlab='n',
ylab = 'Proportion', type='l' )
abline(h=.8)
```