**CS3753 HW4 Theory (20 points)**

**Submit your solution as a PDF or word file via blackboard.**

**Probability (20 points)** Show your work.

1. Toss a fair coin five times, what is the probability of seeing five heads in a row?

(1/2)^5 = 1/32 or 3.125%

2. Toss a loaded coin (phead = 0.9) fivetimes, what is the probability of seeing fiveheads in a row?

(9/10) ^ 5 = 59.049% or .59049

3. Toss a fair coin 5 times, what is the probability of seeing a total of 3 heads and 2 tails?

(1/2)^ 3 \* (1/2)^2 = 1/32 or 3.125% or .03125

4. Given a box of coins where exactly half of the coins are fair coins and the other half are loaded coins (phead = 0.9), if you pick one coin from the box and toss it five times, what is the probability to see five heads in a row?

(1/2) \* ( (.5)^5 + (.9)^5 ) = .31087

5. If you randomly pick a coin from the box mentioned above (i.e., half of coins were loaded with phead = 0.9), toss it **five** times and get **five** heads. What is the probability that this is a fair coin?

1/2 \* (.5)^5 = .016

½ \* (.9)^5 = 0.295

.016 + 0.295 = 0.311 0.016/.311 = 0.05