b. If X is the number of winners, find E[X].

5. i. For a random variable X=U+V, where U and V are independent uniformly distributed over the interval [0,1], find $P(X > 1.2)$.

ii. Also, find Cumulative Distribution Function of U^2.

6. Are some of the following statements correct:?
i. **A small F-test P-value Null hypothesis implies**:

a. all slope coefficients of a multiple linear model equal to zero implies that all coefficients are non-zero;

b. the explanatory power of the model is great.

ii. One of assumptions for multiple regression is that the distribution of each explanatory variable id Normal.

7. Suppose you must weigh 3 objects on chemical scale. For whatever placement of objects (masses) over scales the reading is the difference of weights of objects on the right and left scales plus a random error with mean zero and variance σ^2.

What design of experiment and the method of analysis you'll choose to have unbiased estimates of all three masses with the standard deviations $\sigma^2/16$ each? How many experiments are needed to achieve the accuracy prescribed?

8. Find the stationary distribution for a Markov chain with two states $1, 2$ and $0 < P_{11} = a < 1, 0 < P_{22} = b < 1$.
Hint. Use the balance of flows to and from every state.

9. Let $f(k)$ be the probability for the simple random walk to hit integer $M > k$ before hitting 0 starting from integer k.

Hint. Prove that $f(k) = 1/2(f(k-1) + f(k+1)), f(0) = 0, f(M) = 1$, using conditioning over the outcome of the first jump. Deduce from these relations that $f(k) = k/M$.