In this seventh installment of our introduction to SAS, we will demonstrate a simulation exercise in SAS.

**PRELIMINARY NOTES:**

1. Pseudo random variates are numbers generated by a computer algorithm to simulate real random numbers.

2. SAS has built in functions that generate pseudo random variates from several standard distributions.

3. The algorithm used by SAS to produce these pseudo random variates, must be provided with an initial *seed*.

**OBJECTIVE:**

Our objective is to write SAS code to carry out following tasks:

1. Simulate 100 random samples, each consisting of 20 pseudo random variates with a Unif\([0,1]\) distribution.
2. Compute the sample mean for each of the 100 samples.
3. Simulate 100 random samples, each consisting of 20 pseudo random variates with a Bernoulli(0.4) distribution (Note if X has a Bernoulli(0.4) distribution, then X=1 with probability p=0.4 or X=0 with probability 1−p=1−0.4=0.6.).
4. Compute the sample mean for each of the 100 samples.
5. Simulate 100 random samples, each consisting of 20 pseudo random variates with a Normal\([0,1]\) distribution.
6. Compute the sample mean for each of the 100 samples.

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SAMPLE SAS CODE:
DATA simul1;
  RETAIN seed 45;
  RETAIN n 20;
  RETAIN samples 100;
  DO i=1 TO samples;
    sum=0;
    DO j=1 TO n;
      x=UNIFORM(seed);
      sum=sum+x;
    END;
    xbar=sum/n;
    OUTPUT;
  END;
RUN;QUIT;

DATA simul2;
  RETAIN seed 45;
  RETAIN n 20;
  RETAIN samples 100;
  DO i=1 TO samples;
    sum=0;
    DO j=1 TO n;
      x=RANBIN(seed,1,0.4);
      sum=sum+x;
    END;
    xbar=sum/n;
    OUTPUT;
  END;
RUN;QUIT;

DATA simul3;
  RETAIN seed 45;
  RETAIN n 20;
  RETAIN samples 100;
  DO i=1 TO samples;
    sum=0;
    DO j=1 TO n;
      x=NORMAL(seed);
      sum=sum+x;
    END;
    xbar=sum/n;
    OUTPUT;
  END;
RUN;QUIT;

THE MAIN TASKS:
1. Type in above SAS code in to the PROGRAM EDITOR.
2. Save and then submit the program.